TRAI Audit Wireless Report for MPCG Circle

WEST ZONE

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Prepared by:

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Submitted to:

TRAI
Telecom Regulatory Authority of India

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TRAI
Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)

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2   INTRODUCTION

2.1   ABOUT TRAI

TRAI's mission is to create and nurture conditions for growth of telecommunications in the country in a manner and at a pace that will enable India to play a leading role in the emerging global information society. One of the main objectives of TRAI is to provide a fair and transparent policy environment which promotes a level playing field and facilitates fair competition.

In pursuance of above objective, TRAI has been issuing regulations, order and directives to deal with the issues or complaints raised by the operators as well as the consumers. These regulations, order and directives have helped to nurture the growth of multi operator multi service - an open competitive market from a government owned monopoly. Also, the directions, orders and regulations issued cover a wide range of subjects including tariff, interconnection and quality of service as well as governance of the Authority.

TRAI initiated a regulation - The Standard of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service regulations, 2009 (7 of 2009) dated December 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated October 6, 2006 that provide the benchmarks for the parameters on customer perception of service to be achieved by service provider.

In order to assess the above regulations, TRAI has commissioned a third party agency to conduct the audit of the service providers and check the performance of the operators on the various benchmarks set by Telecom Regulatory Authority of India (TRAI).

2.2   OBJECTIVES

The primary objective of the Audit module is to-

- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report covers the audit results of the audit conducted for Cellular Mobile (Wireless) services in MPCG circle.

2.3 COVERAGE

The audit was conducted in MPCG circle covering all the SSAs (Secondary Switching Areas).
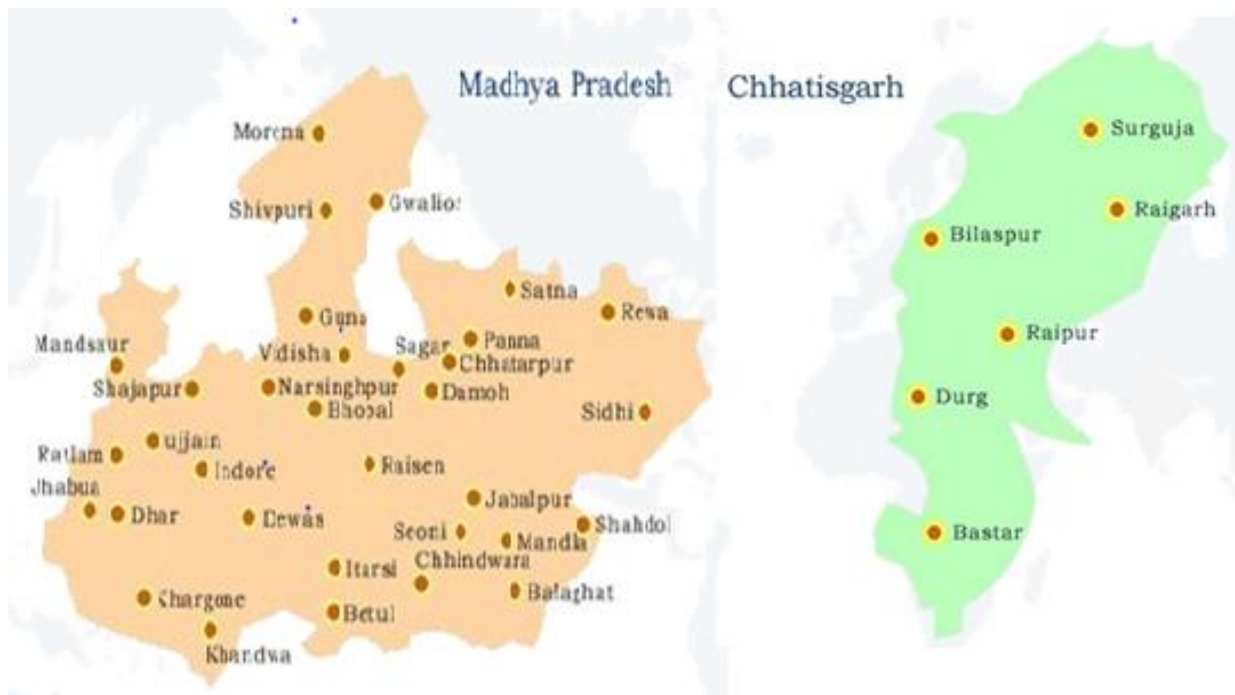
2.4 FRAMEWORK USED
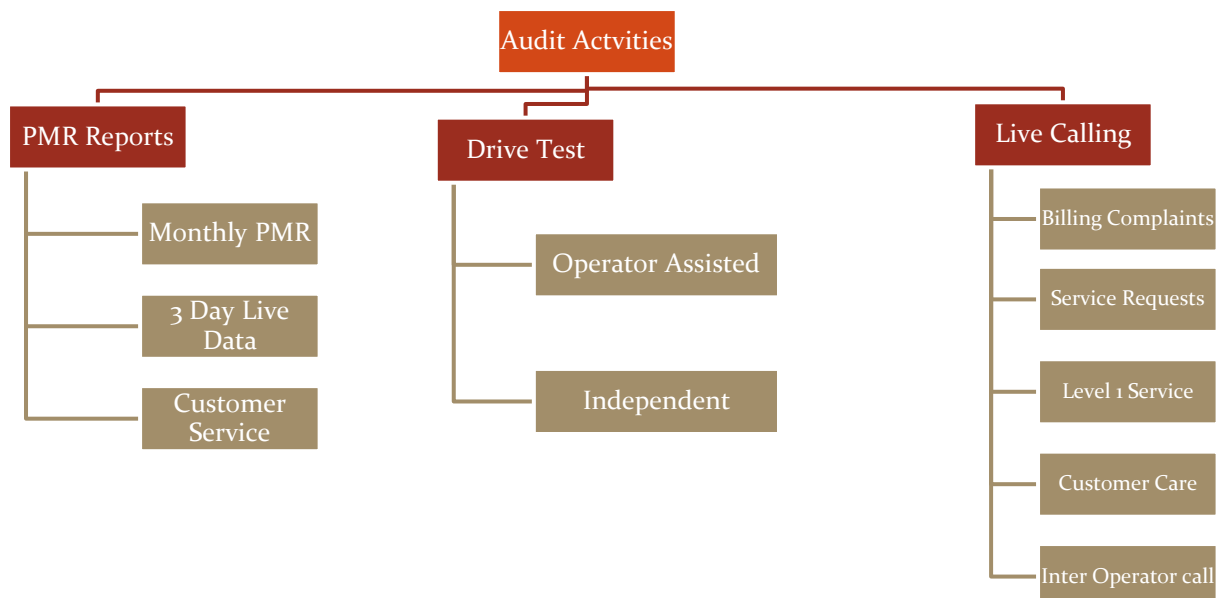
Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1   PMR REPORTS

2.4.1.1   SIGNIFICANCE AND METHODOLOGY

PMR or Performance Monitoring Reports are generated to assess the various Quality of Service parameters involved in the mobile telephony service, which indicate the overall health of service for an operator.

The IMRB auditors inform the operators about the audit schedule in advance. Accordingly, the auditors visit the operator premises to conduct the audit.

During TRAI audit, raw data is extracted from the operator's server/ NOC/ exchange/ OMC/ customer service center/ billing center etc. by the IMRB auditor with assistance from the operator personnel in order to generate PMR reports (Network/ Billing /Customer Service etc).

All the calculations are done by IMRB auditors to generate a new PMR report from that raw data.

The newly generated PMR reports are then taken in hard copy, duly signed by the competent authority of operators. IMRB auditors also sign the same report.

The PMR report for network parameters is taken for each month of the audit quarter and is extracted and verified in the first week of the subsequent month of the audit month. For example, January 2016 audit data was collected in the month of February 2016.

The PMR report for customer service parameters is extracted from Customer Service Center and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending March 2016 (JFM'16) was collected in the month of January 2016.

The raw data extracted from operator's systems is used to create PMR in the following three formats.

- Monthly PMR (Network Parameters & Wireless Data Services) – 2G & 3G
- 3 Day Live Measurement Data (Network Parameters & Wireless Data Services) – 2G & 3G
- Customer Service Data

Let us understand these formats in detail.

2.4.1.2   MONTHLY PMR 2G

This involved calculation of the various 2G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of January, February and March 2016. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

- SDCCH/Paging Channel Congestion
- TCH Congestion
- Point of Interconnection

Connection Maintenance

- Call Drop rate
- Worst affected cells having more than 3% TCH drop

Voice Quality

- % Connections with good voice quality

All the parameters have been described in detail along with key findings of the parameters in section 5 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.3   AUDIT PARAMETERS – NETWORK 2G

Let us now look at the various parameters involved in the audit reports.

Network Related

Network Parameters - 2G		
Parameter Category	**Parameter**	**Benchmark**
Network Availability	**BTSs Accumulated downtime (not available for service)**	**≤ 2%**
	Worst affected BTSs due to downtime	**≤ 2%**
Connection Establishment (Accessibility)	**Call Set-up Success Rate (within licensee's own network)**	**≥ 95%**
	SDCCH/ Paging Chl. Congestion (%age)	**≤ 1%**
	TCH Congestion (%age)	**≤ 2%**
Connection Maintenance (Retainability)	**Call Drop Rate (%age)**	**≤ 2%**
	Worst affected cells having more than 3% TCH drop	**≤ 3%**
	%age of connection with good voice quality	**≥ 95%**
	Point of Interconnection (POI)	**≤ 0.5%**

2.4.1.4   MONTHLY PMR 3G

This involved calculation of the various 3G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of January, February and March 2016. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- Node Bs accumulated downtime
- Worst affected Node Bs due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

- RRC Congestion
- Circuit Switched RAB Congestion
- Point of Interconnection

Connection Maintenance

- Circuit Switched Voice Drop rate
- Worst affected cells having more than 3% Circuit switched Voice drop rate

Voice Quality

- % Connections with good Circuit Switched Voice Quality

All the parameters have been described in detail along with key findings of the parameters in section 5 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.5   AUDIT PARAMETERS – NETWORK 3G

Let us now look at the various parameters involved in the audit reports.

Network Related

Network Parameters - 3G		
Network Availability	Node Bs downtime (not available for service)	≤ 2%
	Worst affected Node Bs due to downtime	≤ 2%
Connection Establishment (Accessibility)	Call Set-up Success Rate (within licensee's own network)	≥ 95%
	RRC Congestion	≤ 1%
	Circuit Switched RAB Congestion	≤ 2%
Connection Maintenance (Retainability)	Circuit Switched voice drop rate	≤ 2%
	Worst affected cells having more than 3% Circuit switched voice drop rate	≤ 3%
	%age of connection with good circuit switched voice quality	≥ 95%
	Point of Interconnection (POI)	0.5%

2.4.1.6   MONTHLY PMR – WIRELESS DATA SERVICES (2G & 3G)

The PMR report for wireless data service (2G and 3G) is extracted at the operator premises and verified every month of the quarter. This includes three parameters-

- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

2.4.1.7   AUDIT PARAMETERS – WIRELESS DATA SERVICES (2G & 3G)

Wireless Data Service		
Service Activation	Activation done within 4 hours	≥ 95%
PDP Context activation success rate	PDP Context activation success rate	≥ 95%
Drop Rate	Drop Rate	≤ 5%

2.4.1.8   POINT OF DATA EXTRACTION

The data is extracted from a terminal/computer connected to OMCR & OSS on the operator network.
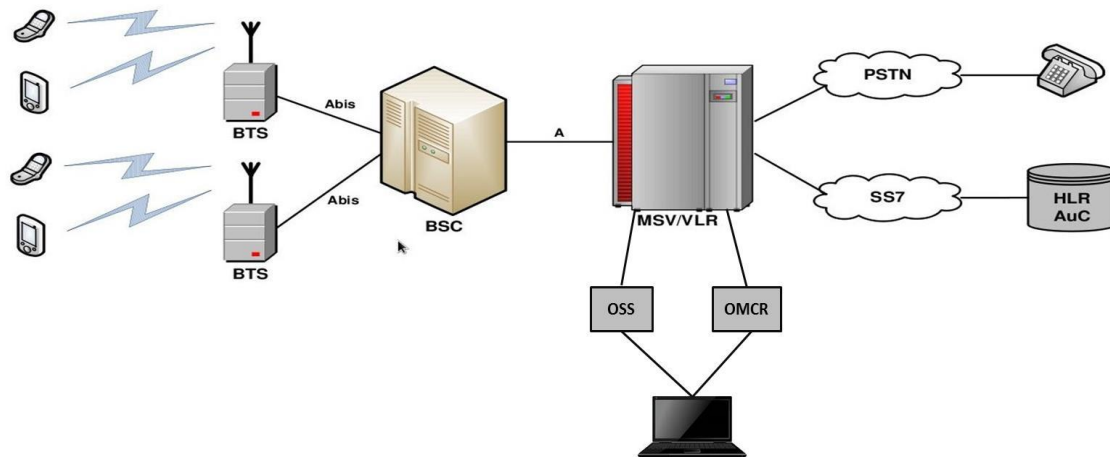
2.4.1.9   STEP BY STEP AUDIT PROCEDURE

The key steps followed for extraction of reports at the operator premises are given below.

Tender document and latest list of licensees as per TRAI are taken as a reference document for assimilating the presence of operators. The wireless operators are then contacted for the audit.

Audit formats and schedule is shared with the operators in advance. Details include day of the visit and date of 3 day data collection and other requirements.

IMRB auditors visit the operator's server/exchange/central NOC to extract data from operator's systems. Operator personnel assist the auditor in extraction process.

The extracted data is validated and verfied by the IMRB auditors.

IMRB auditors then prepare a PMR report from the extracted data with assistance from the operator.

IMRB auditors validate the values with raw data and also provide their comments, wherever required.

The final audit or PMR sheet is signed by the operator person in-charge along with authorized stamp.

Data has been extracted and calculated as per the counter details provided by the operators. The details of counters have been provided in section 8.15 of the report. The calculation methodology for each parameter has been stated in the table given below.

2.4.1.10 CALCULATION METHODOLOGY – NETWORK PARAMETERS 2G

Parameter	Calculation Methodology
BTS Accumulated Downtime	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100
Worst Affected BTS Due to Downtime	(Number of BTSs having accumulated downtime greater than 24 hours in a month / Number of BTS in Licensed Service Area) * 100
Call Setup Success Rate	(Calls Established / Total Call Attempts) * 100
SDCCH/ Paging Channel Congestion	SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.......+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = Number of attempts to establish SDCCH / TCH made on day 1
TCH Congestion	C1 = Average SDCCH / TCH Congestion % on day 1 A2 = Number of attempts to establish SDCCH / TCH made on day 2 C2 = Average SDCCH / TCH Congestion % on day 2 An = Number of attempts to establish SDCCH / TCH made on day n Cn = Average SDCCH / TCH Congestion % on day n
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.......+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n
Call Drop Rate	Total Calls Dropped / Total Calls Established x 100
Worst Affected Cells having more than 3% TCH drop	Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the LSA x 100
Connections with good voice quality	No. of voice samples with good voice quality / Total number of samples x 100

2.4.1.11 CALCULATION METHODOLOGY – NETWORK PARAMETERS 3G

Parameter	Calculation Methodology
Node Bs Accumulated Downtime	Sum of downtime of Node Bs in a month in hours i.e. total outage time of all Node Bs in hours during a month / (24 x Number of days in a month x Number of Node Bs in the network in licensed service area) x 100
Worst Affected Node Bs Due to Downtime	(Number of Node Bs having accumulated downtime greater than 24 hours in a month / Number of Node B in Licensed Service Area) * 100
Call Setup Success Rate	(RRC Established / Total RRC Attempts) * 100
RRC Congestion	RRC / RAB Congestion% = [(A1 x C1) + (A2 x C2) +.......+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = Number of attempts to establish RRC/ RAB made on day 1
Circuit Switched RAB Congestion	C1 = Average RRC/ RAB Congestion % on day 1 A2 = Number of attempts to establish RRC/ RAB made on day 2 C2 = Average RRC/ RAB Congestion % on day 2 An = Number of attempts to establish RRC/ RAB made on day n Cn = Average RRC/ RAB Congestion % on day n
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.......+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n
Circuit Switched Voice Drop Rate	No. of voice RAB normally released / (No. of voice RAB normally released + RAB abnormally released) x 100
Worst Affected Cells having more than 3% Circuit Switched Voice Drop Rate	Number of cells having CSV drop rate > 3% during CBBH in a month / Total number of cells in the licensed area) x 100
Connections with good Circuit switched voice quality	1- (Number of Faulty Transport Blocks In Uplink downlink After Selection Combining Speech / Total number of Transport Blocks In Uplink downlink After Selection Combining Speech)) x 100

2.4.1.12 3 DAY LIVE DATA

The main purpose of 3 day live measurement is to evaluate the network parameters on intraday basis. While the monthly PMR report provides an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the network parameters discussed earlier. All the calculations are done on the basis of that raw data of 3 days.

The 3 day live data provides a sample of 9 days in a quarter (3 days each month of a quarter) with hourly performance, which enables the auditor to identify and validate intraday issues for an operator on the QoS network parameters. For example, network congestion being faced by an operator during busy/peak hours.

Network related parameters were evaluated for a period of 3 days in each month. 3 day live audit was conducted for 3 consecutive weekdays for each month. The data was extracted from each operator's server/ NOC etc. at the end of the 3rd day. The extracted data is then used to create a report (similar to PMR report) to assess the various QoS parameters.

The 3 day live measurement was conducted for network parameters (2G & 3G) and wireless data services (2G & 3G).

Sl. No.	Name of Service Provider	Dates of live measurement Audit		
GSM Operators		January'16	February'16	March'16
1	AIRCEL	6th to 8th Jan'16	1st to 3rd Feb'16	4th to 6th March'16
2	AIRTEL	1st to 3rd Jan'16	1st to 3rd Feb'16	1st to 3rd March'16
3	BSNL	1st to 3rd Jan'16	1st to 3rd Feb'16	1st to 3rd March'16
4	IDEA	4th to 6th Jan'16	8th to 10th Jan'16	1st to 3rd March'16
5	RCOM GSM	28th to 30th Jan'16	1st to 3rd Feb'16	8th to 10th March'16
6	Tata GSM	12th to 14th Jan'16	27th to 29th Feb'16	21st to 23rd March'16
7	Videocon	4th to 6th Jan'16	8th to 10th Jan'16	1st to 3rd March'16
8	VODAFONE	1st to 3rd Jan'16	8th to 10th Jan'16	1st to 3rd March'16
CDMA Operators				
9	RCOM CDMA	28th to 30th Jan'16	1st to 3rd Feb'16	8th to 10th March'16
10	TATA CDMA	12th to 14th Jan'16	27th to 29th Feb'16	21st to 23rd March'16
3G Operators				
2	AIRTEL	1st to 3rd Jan'16	1st to 3rd Feb'16	1st to 3rd March'16
3	BSNL	1st to 3rd Jan'16	1st to 3rd Feb'16	1st to 3rd March'16
4	IDEA	4th to 6th Jan'16	8th to 10th Jan'16	1st to 3rd March'16
6	Tata GSM	12th to 14th Jan'16	27th to 29th Feb'16	21st to 23rd March'16

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2.4.1.13 TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Time Consistent Busy Hour" or "TCBH" means the one hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration and such Time Consistent Busy Hour shall be established on the basis of analysis of traffic data for a period of ninety days.

Step by step procedure to identify TCBH for an operator:

Day wise raw data is fetched from the operator's OMCR and kept in a readable format (preferably MS-Excel). Data for a period of 90 days is used to identify TCBH.

The 90 day period is decided upon the basis of month of audit. For example, for audit of Aug 2015, the 90 day period data used to identify TCBH would be the data of Dec, Jul and Aug 2015

For each day, the hour in which average traffic of the resource group concerned is greatest for the day will be the 'Busy Hour' for the operator.

The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as TCBH for the operator

2.4.1.14 CBBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Cell Bouncing Busy Hour (CBBH) means the one hour period in a day during which a cell in cellular mobile telephone network experiences the maximum traffic.

Step by step procedure to identify CBBH for an operator:

Day wise raw data is fetched from the operator's OMCR and kept in a readable format (preferably MS-Excel). Data for a period of 90 days is used to identify CBBH.

For each day, the hour in which a cell in cellular mobile telephone network experiences maximum traffic for the day will be the 'Busy Hour' for the operator.

The 90 day period is decided upon the basis of month of audit. For example, for audit of Dec 2015, the 90 day period data used to identify CBBH would be the data of Oct, Nov and Dec 2015

The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as CBBH for the operator

2.4.1.15 CUSTOMER SERVICE PARAMETERS

The data to generate PMR report for customer service parameters is extracted at the operator premises and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending March 2016 (JFM'16) was collected in the month of January 2016. To extract the data for customer service parameters for the purpose of audit, IMRB auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

The operators are duly informed in advance about the audit schedule.

The Customer Service Quality Parameters include the following:

- Metering and billing credibility (postpaid and prepaid)
- Resolution of billing/charging complaints
- Period of applying credit/waiver/adjustment to customer's account
- Response time to the customer for assistance
- Termination/closure of service
- Time taken for refund of security deposit after closures.

Most of the customer service parameters were calculated by averaging over the quarter; however billing parameters were calculated by averaging over one billing cycle for a quarter.

All the parameters have been described in detail along with key findings of the parameter in section 6 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.16 AUDIT PARAMETERS – CUSTOMER SERVICE

Metering and Billing Credibility	Benchmark
No of billing complaints received - Post paid	≤ 0.1%
No. of billing complaints received- Prepaid	≤ 0.1%
Resolution of billing/ charging complaints within 4 weeks	98%
Resolution of billing/ charging complaints within 6 weeks	100%
Period of applying credit/ waiver within 1 week of resolution of complaint	100%
Response Time to the Customer form Assistance	
Accessibility of call centre/customer care	≥ 95%
Percentage of calls answered by the operators (voice to voice) within 90 seconds	≥ 95%
Termination/ closure of service	≤ 7 days
Time taken for refund of deposits after closures within 60 days	100%

2.4.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

Parameter	Calculation Methodology
Metering and billing credibility - Postpaid	Total billing complaints received during the relevant billing cycle / Total bills generated during the relevant billing cycle *100
Metering and billing credibility – Prepaid	Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter * 100
Resolution of billing/ charging complaints (Postpaid + Prepaid)	There are two benchmarks involved here: Billing or Charging Complaints resolved in 4 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100 Billing or Charging Complaints resolved in 6 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100
Period of applying credit waiver	Number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver * 100
Call centre performance IVR (Calling getting connected and answered by IVR)	Number of calls connected and answered by IVR/ All calls attempted to IVR * 100
Call centre performance (Voice to Voice)	Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100 The calculation excludes the calls dropped before 90 seconds
Time taken for termination/ closure of service	Number of closures done within 7 days/ total number of closure requests * 100
Time taken for refund for deposit after closures	Number of cases of refund after closure done within 60 days/ total number of cases of refund after closure * 100

2.4.2   LIVE CALLING

2.4.2.1   SIGNIFICANCE AND METHODOLOGY

The main purpose of live calling is to verify the performance of various customer service parameters by doing test calls to the subscribers/ specific numbers. Below is a step wise procedure of live calling.

The IMRB auditor visits each operator premises to do live calling. The operators provide the raw data of customer complaints (billing & service) and also the list of customer service numbers to be verified through live calling

IMRB auditors then make live calls using operator SIM to a random sample of subscribers from the raw data provided to verify the resolution of complaints

The auditors also verify the performance of call center, level 1 services by calling the numbers using operator SIM. The list of call center numbers is provided by the operator. The process followed to test Level 1 services has been stated below.

Using operator SIM, the auditors also make test calls to subscribers of other operators to assess the inter-operator call connectivity in the same licensed service area

Live calling activity was carried out during the period of March 2016. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of February 2016 was considered for live calling activity conducted in March 2016.

A detailed explanation of each parameter is explained below.

2.4.2.2   BILLING COMPLAINTS

Live calling is done to verify Resolution of billing complaints within stipulated time. The process for this parameter is stated below.

- ✤ Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically
- ✤ A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator

Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20th December, 2009 were considered as population for selection of samples. A complete list of the same has been provided in Section 6.1.1.

TRAI benchmark-

Resolution of billing/ charging complaints - 98% within 4 weeks, 100% within 6 weeks

2.4.2.3   SERVICE COMPLAINTS REQUESTS

"Service request" means a request made to a service provider by its consumer pertaining to his account, and includes.

- A request for change of tariff plan
- A request for activation or deactivation of a value added service or a supplementary service or a special pack
- A request for activation of any service available on the service provider's network
- A request for shift or closure or termination of service or for billing details

All the complaints other than billing were covered. A total of 100 calls per service provider for each service in licensed service area were done by the IMRB auditors.

2.4.2.4   LEVEL 1 SERVICE

Level 1 is used for accessing special services like emergency services, supplementary services, inquiry and operator-assisted services.

Level 1 Services include services such as police, fire, ambulance (Emergency services). Test calls were made from operator SIMs. A total of 300 test calls were made per service provider in the quarter.

In JFM'16, IMRB has tried contacting the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

2.4.2.4.1   PROCESS TO TEST LEVEL 1 SERVICES

- On visiting the operator's premises (Exchange/Central Server etc.), auditors ask the operator authorized personnel to provide a list of Level 1 services being active in their service. The list should contain a description of the numbers along with dialing code.
- Operators might provide a long list of L1 services. To identify emergency L1 service numbers, auditors check if there is any number that starts with code '10' in that list. If auditors find any emergency number in addition to the below list, that number is also tested during live calling.
- On receiving the list, auditors verify it if the below given list of numbers are active in the service provider's network.
- If there are any other additional numbers provided by the operator, auditors also do live calling on those numbers along with below list.
- If any of these numbers is not active, then we would write the same in our report, auditors write in the report.
- Post verifying the list, auditors do live calling by equally distributing the calls among the various numbers and update the results in the live calling sheet.

L1 Code	Description
100	Police
101	Fire
102	Ambulance
104	Health Information Helpline
108	Emergency and Disaster Management Helpline
138	All India Helpine for Passangers
149	Public Road Transport Utility Service
181	Chief Minister Helpline
182	Indian Railway Security Helpline
1033	Road Accident Management Service
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'
1056	Emergency Medical Services
106X	State of the Art Hospitals
1063	Public Grievance Cell DoT Hq
1064	Anti Corruption Helpline
1070	Relief Commission for Natural Calamities
1071	Air Accident Helpline
1072	Rail Accident Helpline
1073	Road Accident Helpline
1077	Control Room for District Collector
1090	Call Alart (Crime Branch)
1091	Women Helpline
1097	National AIDS Helpline to NACO
1099	Central Accident and Trauma Services (CATS)
10580	Educationa & Vocational Guidance and Counselling
10589	Mother and Child Tracking (MCTH)
10740	Central Pollution Control Board
10741	Pollution Control Board
1511	Police Related Service for all Metro Railway Project
1512	Prevention of Crime in Railway
1514	National Career Service(NCS)
15100	Free Legal Service Helpline
155304	Municipal Corporations
155214	Labour Helpline
1903	Sashastra Seema Bal (SSB)
1909	National Do Not Call Registry
1912	Complaint of Electricity
1916	Drinking Water Supply
1950	Election Commission of India

2.4.2.5   CUSTOMER CARE

Live calling is done to verify response time for customer assistance is done to verify the performance of call center in terms of

- ✤ Calls getting connected and answered by operator's IVR.
- ✤ % age of calls answered by operator / voice to voice) within 90 seconds: In 95% of the cases or more

The process for this parameter is stated below.

- Overall sample size is 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1100 HRS to 1400 HRS and 50 calls between 1600 HRS to 1900 HRS.
- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

2.4.2.6   INTER OPERATOR CALL ASSESEMENT

A total of 100 calls per service provider to all the other service providers in a licensed service area were done for the purpose of audit.

2.4.3   VOICE DRIVE TEST – 2G & 3G

2.4.3.1   SIGNIFICANCE AND METHODOLOGY

Drive test, as the name suggests, is conducted to measure the performance of an operator in a moving vehicle in a specified network coverage area.
The main purpose of the drive test is to check the health of the mobile network of various operators in the area in terms of coverage (signal strength), voice quality, call drop rate, call set up success rate etc.

To assess the indoor coverage, the test is also conducted at two static indoor locations in each SSA, such as Malls, office buildings, shopping complexes, government buildings etc.

IMRB conducted two types of drive tests as mentioned below.
- Operator Assisted Drive Test
- Independent Drive Test

The main difference between the two is that in the operator assisted, operators participate in the drive test along with their hardware, software, phones etc. while in the independent drive test IMRB conducts the drive test on solitary basis and uses its own hardware. Operators generally do not have any knowledge of the drive test being conducted.
A detailed explanation of the two methodologies has been provided below.

2.4.3.2   OPERATOR ASSISTED DRIVE TEST – VOICE 2G & 3G

SSAs are selected according to the total no. of SSAs on that region and audited in each quarter, at least 1 SSA in each month it may be more depends on the total no. of drive on that circle. The drive tests were conducted for all operators in the circle, for both 2G and 3G voice services. As per TRAI instructions, the 2G drive was done in 2G only mode, while 3G drive test was conducted in dual mode (3G on priority).

As per the new directive given by TRAI headquarters, drive test in the quarter were conducted at a SSA level. SSAs have been defined in two categories by TRAI as per the criticality of the SSA.

1. Normal SSA
2. Difficult SSA

During the drive test in normal SSA, the methodology adopted for the drive test is:

- 3 consecutive days were selected for drive test in selected SSA and SSA list was finalized by TRAI office New Delhi.
- On an average, a minimum of 80 kilometers was covered each day, covering a minimum distance of 250kms in 3 days.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI Office New Delhi.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
  - o   With In city
  - o   Major Roads
  - o   Highways
  - o   Shopping complex/ Mall
  - o   Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30-50 km/hr.
- The holding period of each test call was 120 seconds.
- A test call was generated 10 seconds after the previous test call is completed. For 3G, the gap between two calls was 30 seconds.
- Height of the antenna was kept uniform in case of all service providers.

In drive test for difficult SSAs, the methodology adopted for the drive test is:-
- Drive test was conducted for 6 consecutive days in selected SSAs and SSA list was finalized by TRAI office New Delhi.
- On an average, a minimum of 80 kilometers was covered each day, covering a minimum distance of 500kms in 6 days.

Rest of the activities for drive test in difficult SSAs are same as drive test for normal SSAs.

2.4.3.3   INDEPENDENT DRIVE TEST – 2G & 3G

The number of independent drive tests to be conducted and their locations are decided basis TRAI recommendation.

- A minimum of 80 kilometers was traversed during the independent drive test in a SSA on each day and SSA list was finalized by TRAI office New Delhi.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.

- ✤ Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- ✤ The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- ✤ The route was classified as-
  - o With In city
  - o Major Roads
  - o Highways
  - o Shopping complex/ Mall
  - o Office Complex/ Government Building
- ✤ There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- ✤ The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- ✤ The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- ✤ The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- ✤ The speed of the vehicle was kept at around 30-50 km/hr.
- ✤ The holding period of each test call was 120 seconds.
- ✤ A test call was generated 10 seconds after the previous test call is completed. For 3G, the gap between two calls was 30 seconds.
- ✤ Height of the antenna was kept uniform in case of all service providers.

2.4.3.4   PARAMETERS EVALUATED DURING VOICE DRIVE TEST – 2G & 3G

The parameters which were captured during the drive test include. Below are the parameters which are captured for the GSM and CDMA operators.

- ✤ Coverage-Signal strength (GSM)
  - ✓ Total calls made (A)
  - ✓ Number of calls with signal strength between 0 to -75 dBm
  - ✓ Number of calls with signal strength between 0 to -85 dBm
  - ✓ Number of calls with signal strength between 0 to -95 dBm
- ✤ Coverage-Signal strength (CDMA)
  - ✓ Total Ec/Io BINS (A)
  - ✓ Total Ec/Io BINS with less than –15 (B)
  - ✓ Low Interference = [1 - (B/A)] x 100
- ✤ Voice quality (GSM)
  - ✓ Total RxQual Samples– A
  - ✓ RxQual samples with 0-5 value – B
  - ✓ %age samples with good voice quality = B/A x 100
- ✤ Voice quality (CDMA)
  - ✓ Total FER BINs (forward FER) – A
  - ✓ FER BINs with 0-2 value (forward FER) – B
  - ✓ FER BINs with 0-4 value (forward FER) – C
  - ✓ %age samples with FER bins having 0-2 value (forward FER) = B/A x 100
  - ✓ %age samples with FER bins having 0-4 value (forward FER) = C/A x 100
  - ✓ No. of FER samples with value > 4 = [A-C]

- ✤ Call setup success rate
  - ✓ Total number of call attempts – A
  - ✓ Total Calls successfully established – B
  - ✓ Call success rate (%age) = (B/A) x 100
- ✤ Blocked calls
  - ✓ 100% - Call Set up Rate
- ✤ Call drop rate
  - ✓ Total Calls successfully established – A
  - ✓ Total calls dropped after being established – B
  - ✓ Call Drop Rate (%age) = (B/A) x 100

2.4.4 WIRELESS DATA DRIVE TEST – 2G & 3G

The data drive test is conducted at stationary places called hotspots in a SSA for all the days the voice drive test is conducted in the same SSA.

2.4.4.1 METHODOLOGY

The measurement setup is used to conduct test calls for measuring successful data transmission download and upload attempts, minimum download speed, average throughput and latency is given in figure given below.

The basic measurement set-up consists of a Test-Device and a Test-Server with specified software and hardware. Test calls are established between the Test-Device and Test-Server and measurements are made for the respective QoS parameters. These parameters are measured in a stationary mode. Service Activation/Provisioning, PDP Context Activation Success Rate and Drop rate are reported from the actual network counters/database.

- ✤ To assess the quality of the connection between an end user and an Internet Service Provider (ISP), ideally the Test-Server is placed as near as possible to the gateway providing the interconnection between access network and ISP network. The location of the test-server is as near as possible to the gateway providing the interconnection between access network and ISP network implies that the measurements will not reflect the influence in the QoS of the ISP network, between that gateway and the gateway interconnecting with the Internet.
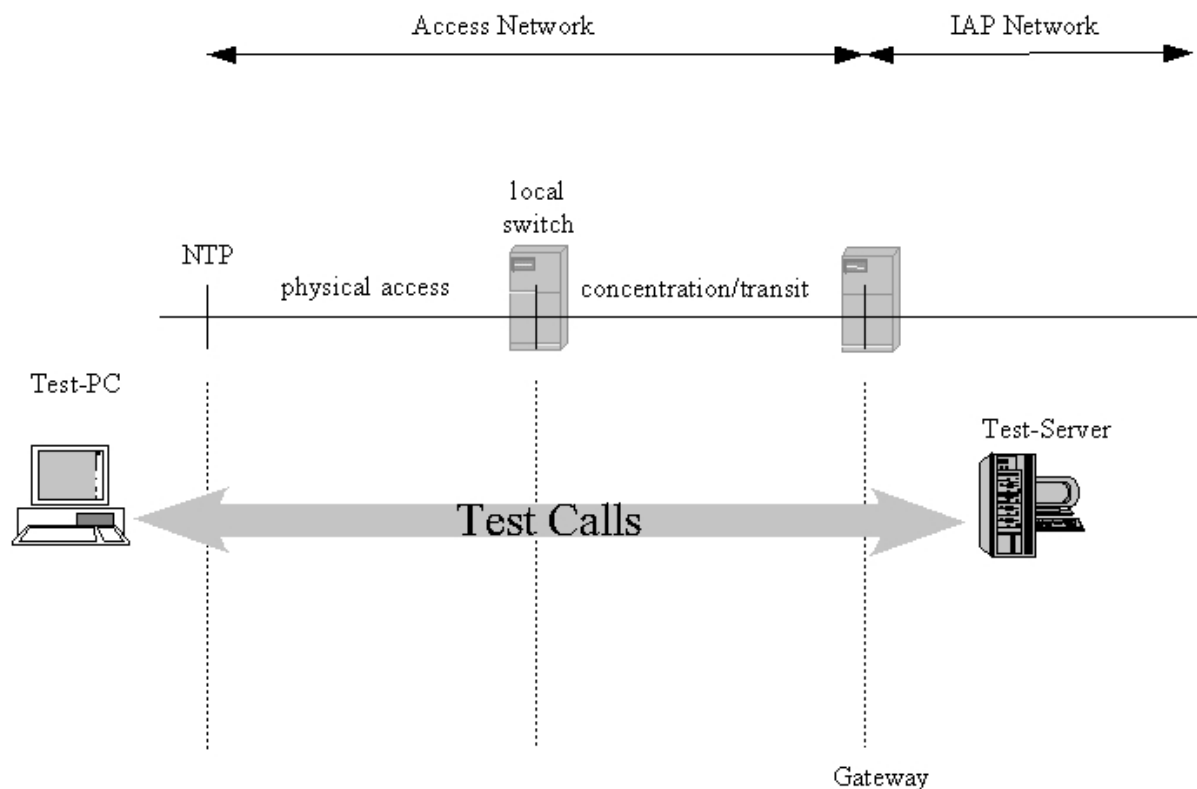
Figure for Measurement set-up

2.4.4.2   REQUIREMENTS FOR THE TEST-SERVER

For all tests, a dedicated test server is used as a well-defined reference. The test server may be located centrally for all the licensed service areas (LSA) or for a number of LSAs or in each LSA (not more than one in each LSA). Under no circumstances a commercial server (e.g. www.yahoo.com) is used, since the test conditions for such a server may change over time making later reproduction of the results impossible. The test server is identified by an IP address and not by its fully qualified Domain Name (FQDN) in order to avoid issues with Domain Name Server (DNS) lookup and including the DNS caching strategies of the used operating system into the measurement.

   ✎ The Transmission Control Protocol (TCP) settings of the server tested against, is also recorded. Since the number of host operating systems for internet servers is larger than on the client side, no detailed recommendation concerning the TCP settings of the server is given.

However, the TCP stack of the reference server should at least be capable of the following:
   o   Maximum Segment Size between 1380 Bytes and 1460 Bytes.
   o   TCP RX Window Size > 4096 Bytes
   o   SACK (Selective Acknowledgement) enabled.
   o   TCP Fast Retransmit.
   o   TCP Fast Recovery enabled.
   o   Delayed ACK enabled (200ms).

2.4.4.3   TEST FILES

The test file consist of incompressible data i.e. a data file that is already compressed, e.g. like a zip or jpg file. The test file has at least twice the size (in Kbit) of the theoretically maximum data transmission rate per second (in Kbit/s) of the Internet access under consideration.

2.4.4.4   REPRESENTATIVENESS OR NUMBER OF TEST CALLS

- ✥ The choice of adequate test calls, i.e. geographical locations of origin and destination of calls as well as traffic variations, is a crucial point with respect to the comparability and validation of the statistics are calculated for the measured parameters. For each parameter, it is ensured that the samples are aggregated over all classes of customers for fairness in reflecting the QoS actually perceived by the user and the statistics are preserved to substantiate the same.
- ✥ The necessary number of samples (test calls) are 1067 for each of the category "A" and "Metro" licensed service area (LSA), 600 for each of the category "B" LSA and 384 for each of the category "C" LSA for all the parameters.

2.4.4.5   PARAMETERS EVALUATED DURING DATA DRIVE TEST AT HOTSPOTS

2.4.4.5.1   SUCCESSFUL DATA TRANSMISSIONS DOWNLOAD ATTEMPTS

The successful data download attempts is defined as the ratio of successful data downloads to the total number of data download attempts in a specified time period. A data transmission is successful if a test file is downloaded completely and with no errors.

Measurement:

The percentage that is the sum total of successful data downloads, divided by the sum total of all attempts to download a test file is provided. The statistics are calculated from test calls made according to the measurement set-up and taking into account the representativeness requirements. The successful data download is measured by downloading a test file. An attempt to transmit the test file is considered unsuccessful if it takes longer than 60 seconds.

Successful data transmission download attempts =

$$\frac{\text{Total Successful download attempts} \times 100}{\text{Total download attempts}}$$

2.4.4.5.2 SUCCESSFUL DATA TRANSMISSION UPLOAD ATTEMPTS

The successful data upload attempts is defined as the ratio of successful data uploads to the total number of data upload attempts in a specified time period. A data upload is successful if a test file is uploaded completely and with no errors.

Measurement:

The percentage that is the sum total of successful data uploads, divided by the sum total of all attempts to upload a test file should be provided. The statistics are calculated from test calls made according to the measurement set-up and taking into account the representativeness requirements. The successful data upload is measured by uploading a test file. An attempt to transmit the test file is considered unsuccessful if it takes longer than 60 seconds.

Successful data transmission upload attempts = $\dfrac{\text{Total Successful upload attempts} \times 100}{\text{Total upload attempts}}$

2.4.4.5.3 MINIMUM DOWNLOAD SPEED

The download speed is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device.

Measurement:

The minimum download speed is calculated from test calls made according to the measurement set-up. Test calls are to be made to weigh the results according to the patterns of real traffic. Minimum download speed is the average of the lower 10% of all such test calls.

Minimum download speed (average of lower 10% of all test calls) =
$$\dfrac{\text{Download speed } (A_1+A_2+A_3+A_4+A_5+A_6) \times 100}{6}$$
Note- A_1, A_2, A_3, A_4 A_5 & A_6 are download speeds at 6 hotspots

2.4.4.5.4 AVERAGE THROUGHPUT FOR PACKET DATA

It is defined as the rate at which packets are transmitted in a network. In a mobile network the download speed varies depending on the number of users in a particular location. Even though a service provider may be advertising certain speed, the actual speed may vary as per the number of users in the network and there could be customer dissatisfaction on account of relatively slow speed. Hence, there is a need to prescribe an average throughput to protect the interest of consumers. The service providers need to constantly upgrade their network to meet average throughput benchmark.

- The throughput is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device.
- The service provider will advertise the throughput being offered to its customers as per their category or plan and it should be meted out as per their commitment.

Measurement:

The average throughput for packet data should be calculated from all the test calls made according to the measurement setup.

Test calls are made to weigh the results according to the patterns of real traffic. Average throughput is calculated as the average of all such test calls.

Average Throughput for Packet data = Average of download attempts in Kbit/ average download time in secs

2.4.4.5.5 LATENCY

Latency is the amount of time taken by a packet to reach the receiving endpoint after being transmitted from the sending point. This time period is termed the "end-to-end delay" occurring along the transmission path. Latency generally refers to network conditions, such as congestion, that may affect the overall time required for transit.

Measurement:

Latency is measured with the test server for ping connected directly to the server on the same Intranet domain.

Latency (Percentage of successful pinged) = $\dfrac{\text{Total number of successful ping} \times 100}{\text{Total number of ping sent to the Test Server}}$

2.5 OPERATORS COVERED 2G AND 3G

Name of Operator	Number of Subscriber as per VLR-2G
Aircel	198
Airtel	12152307
BSNL	2206264
Idea	22928438
Reliance CDMA	8967
Reliance GSM	12474300
Tata CDMA	4778068
Tata GSM	1433454
Videocon	1298349
Vodafone	5337446
Name of Operator	**Number of Subscriber as per VLR-3G**
Airtel 3G	11486501
BSNL 3G	2079137
Idea 3G	22274600
Tata 3G	16750

March'16 VLR data was considered for the number of subscribers.

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark   Best Performing Operator

3   CRITICAL FINDINGS

PMR Consolidated 2G (Network Parameters)

- ➢ Videocon failed to meet the benchmark for BTS Accumulated downtime.

Wireless Data Services 2G & 3G

- ➢ Aircel failed to meet the benchmark for Activation within 4 hours for 2G.
- ➢ Data for most of the parameters for wireless data services was not submitted by most of the operators, stating technical challenges at their end.

Live Calling

- ➢ Only Reliance GSM and Videocon were able to meet the benchmark of resolving 98% complaints within 4 weeks.
- ➢ The benchmark for resolving 100% complaints within 6 weeks was not met by Reliance CDMA, Tata GSM and Vodafone.
- ➢ Aircel, Tata CDMA, Tata GSM, Videocon and Vodafone failed to meet the TRAI benchmark for level 1 service.

Metering and billing credibility

- ➢ For the billing disputes of post-paid subscribers, it was observed that Airtel, Idea and Vodafone failed to meet the TRAI benchmark for the parameter.
- ➢ For the prepaid customers, Idea failed to meet the benchmark of charging disputes.
- ➢ Airtel, Reliance CDMA & GSM and Tata GSM did not meet the benchmark of answering 95% calls within 90 seconds.

Drive Test (Operator Assisted)

- ➢ Aircel 2G failed to meet the benchmark for call drop rate in Damoh SSA
- ➢ BSNL 3G failed to meet the benchmark in outdoor locations in Damoh SSA.
- ➢ Reliance GSM failed to meet the benchmark in outdoor locations in Itarsi SSA
- ➢ BSNL 3G failed to meet the benchmark in outdoor locations in Itarsi SSA.
- ➢ Reliance GSM failed to meet the benchmark in outdoor locations in Sagar SSA.
- ➢ BSNL 3G failed to meet the benchmark in outdoor locations in Sagar SSA.
- ➢ Reliance GSM failed to meet the benchmark in outdoor locations in Bilaspur SSA.
- ➢ BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations in Mandsaur SSA.
- ➢ BSNL 3G failed to meet the benchmark in indoor locations in Mandsaur SSA.
- ➢ BSNL 3G failed to meet the benchmark in outdoor locations in Mandsaur SSA
- ➢ BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations in Sajapur SSA
- ➢ BSNL 3G failed to meet the benchmark in outdoor locations in Sajapur SSA
- ➢ BSNL 3G failed to meet the benchmark in outdoor locations in Balaghat SSA
- ➢ Reliance GSM failed to meet the benchmark in outdoor locations in Betul SSA
- ➢ BSNL 3G failed to meet the benchmark in outdoor as well as indoor locations in Betul SSA

Drive Test (Independent)

> Airtel 2G & 3G, BSNL 2G & 3G, TATA GSM, Videocon 2G and Vodafone 2G failed to meet the benchmark for voice quality in Indore city.
> Airtel 2G, BSNL 3G, Reliance GSM & 3G, Tata 3G and Videocon failed to meet the benchmark for CSSR in Indore city.
> Airtel 3G, BSNL 2G & 3G, Idea 2G & 3G, Reliance GSM & 3G, Tata GSM & 3G and Videocon failed to meet the benchmark for call drop rate in Indore city

4 EXECUTIVE SUMMARY

The objective assessment of Quality of Service (QoS) carried out by IMRB gives an insight into the overall performance of various operators in the MPCG circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

4.1 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 2G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.36%	1.04%	97.91%	0.37%	0.00%	0.70%	0.52%	98.93%
Airtel	0.13%	0.28%	98.92%	0.07%	0.50%	0.69%	1.59%	97.89%
BSNL	1.89%	1.44%	96.94%	0.43%	1.28%	1.18%	1.77%	NA
Idea	1.59%	0.27%	97.21%	0.38%	1.42%	0.61%	1.23%	97.84%
Reliance CDMA	0.02%	0.06%	99.06%	NA	0.23%	0.07%	0.49%	NA
Reliance GSM	0.28%	1.28%	96.33%	0.08%	0.80%	0.18%	0.63%	98.51%
Tata CDMA	0.17%	0.00%	97.73%	NA	0.03%	0.26%	2.84%	99.24%
Tata GSM	0.08%	0.02%	99.12%	0.08%	0.06%	0.53%	2.21%	98.91%
Videocon	2.37%	0.31%	98.34%	0.20%	0.66%	0.67%	2.51%	98.34%
Vodafone	0.07%	0.10%	99.44%	0.18%	0.56%	0.57%	2.93%	98.89%

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

Following are the parameter wise observations for wireless operators for MPCG circle:

BTSs Accumulated Downtime:

Videocon failed to meet the benchmark. Minimum BTS Accumulated downtime was recorded for Reliance CDMA at 0.02%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Tata CDMA at 0.00%.

Call Set-up Success Rate (CSSR):

All the operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.44%.

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SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion, while Airtel recorded the best SDCCH / Paging Channel Congestion at 0.07%.

TCH Congestion:

All the operators met the benchmark for TCH congestion, while Aircel performed the best on TCH congestion at 0.00%.

Call Drop Rate:

All the operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance CDMA at 0.07%.

Worst Affected Cells Having More than 3% TCH Drop:

Vodafone failed to meet the benchmark. Best performance was recorded for Reliance CDMA at 0.49%.

Voice Quality

All operators met the benchmark. Best performance was recorded for Tata CDMA at 99.24%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis PMR data.

4.1.1 PMR DATA - JANUARY FOR 2G

Month								
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month January	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.38%	2.34%	98.06%	0.04%	0.00%	0.97%	1.04%	98.63%
Airtel	0.11%	0.13%	98.82%	0.05%	0.45%	0.74%	1.62%	97.80%
BSNL	1.93%	1.39%	97.14%	0.44%	1.23%	1.16%	1.72%	NDR
Idea	4.62%	0.23%	97.33%	0.41%	1.32%	0.65%	1.29%	97.75%
Reliance CDMA	0.01%	0.11%	99.15%	NA	0.22%	0.07%	0.43%	98.86%
Reliance GSM	0.24%	0.25%	96.20%	0.08%	0.87%	0.19%	0.56%	98.51%
Tata CDMA	0.15%	0.00%	95.15%	NA	0.00%	0.33%	3.43%	99.28%
Tata GSM	0.10%	0.00%	98.54%	0.09%	0.03%	0.55%	2.27%	98.94%
Videocon	6.94%	0.23%	98.43%	0.11%	0.58%	0.62%	2.43%	98.46%
Vodafone	0.08%	0.10%	99.46%	0.13%	0.54%	0.62%	3.35%	98.89%

4.1.2 PMR DATA – FEBRUARY FOR 2G

Month								
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month February	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.30%	0.00%	97.62%	0.64%	0.00%	0.48%	0.26%	99.25%
Airtel	0.11%	0.19%	98.96%	0.05%	0.48%	0.67%	1.59%	97.88%
BSNL	1.82%	1.45%	96.79%	0.33%	1.33%	1.17%	1.79%	NDR
Idea	0.08%	0.20%	97.04%	0.34%	1.51%	0.60%	1.21%	97.84%
Reliance CDMA	0.02%	0.06%	98.95%	NA	0.22%	0.08%	0.51%	99.03%
Reliance GSM	0.24%	1.70%	96.52%	0.07%	0.81%	0.17%	0.67%	98.51%
Tata CDMA	0.15%	0.00%	99.12%	NA	0.10%	0.22%	2.65%	99.21%
Tata GSM	0.08%	0.02%	99.41%	0.07%	0.06%	0.52%	2.17%	98.88%
Videocon	0.10%	0.29%	98.21%	0.26%	0.80%	0.70%	2.60%	98.28%
Vodafone	0.04%	0.09%	99.47%	0.10%	0.53%	0.54%	2.66%	98.88%

4.1.3 PMR DATA - MARCH FOR 2G

	Month							
	Network Availability		**Connection Establishment (Accessibility)**			**Connection Maintenance (Retainability)**		
Name of Service Provider Month March	**BTSs Accumulated downtime (not available for service)**	**Worst affected BTSs due to downtime**	**Call Set-up Success Rate (within licensee's own network)**	**SDCCH/ Paging Chl. Congestion**	**TCH Congestion**	**Call Drop Rate (%age)**	**Worst affected cells having more than 3% TCH drop**	**%age of connection with good voice quality**
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.39%	0.78%	98.05%	0.42%	0.00%	0.62%	0.26%	98.97%
Airtel	0.18%	0.51%	98.96%	0.11%	0.58%	0.66%	1.57%	98.00%
BSNL	1.92%	1.47%	96.91%	0.51%	1.28%	1.22%	1.81%	NDR
Idea	0.11%	0.39%	97.25%	0.41%	1.42%	0.58%	1.19%	97.94%
Reliance CDMA	0.02%	0.00%	99.08%	NA	0.23%	0.08%	0.53%	98.99%
Reliance GSM	0.37%	1.87%	96.26%	0.08%	0.73%	0.17%	0.64%	98.50%
Tata CDMA	0.20%	0.00%	98.93%	NA	0.00%	0.31%	2.65%	99.25%
Tata GSM	0.06%	0.03%	99.42%	0.07%	0.09%	0.53%	2.17%	98.90%
Videocon	0.12%	0.40%	98.39%	0.23%	0.61%	0.69%	2.49%	98.30%
Vodafone	0.09%	0.12%	99.40%	0.30%	0.60%	0.56%	2.77%	98.89%

4.2   3 DAY DATA – CONSOLIDATED FOR 2G

A three day live measurement was conducted to measure the QoS provided by the operators. The table provided below gives a snapshot of the performance of all operators during live measurement.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.52%	0.00%	97.20%	0.28%	0.00%	0.34%	0.43%	99.08%
Airtel	0.11%	0.03%	98.92%	0.04%	0.43%	0.68%	1.61%	97.88%
BSNL	1.66%	0.44%	97.40%	0.43%	1.06%	1.17%	1.77%	NA
Idea	1.19%	0.00%	97.13%	0.35%	1.50%	0.61%	1.22%	97.83%
Reliance CDMA	0.03%	0.00%	99.10%	NA	0.23%	0.08%	0.44%	NA
Reliance GSM	0.13%	0.62%	96.18%	0.08%	0.91%	0.17%	0.63%	98.50%
Tata CDMA	0.12%	0.00%	97.91%	NA	0.06%	0.25%	1.95%	99.22%
Tata GSM	0.07%	0.00%	99.09%	0.06%	0.06%	0.53%	1.69%	98.98%
Videocon	2.91%	0.08%	98.82%	0.11%	0.37%	0.61%	0.87%	98.60%
Vodafone	0.04%	0.00%	99.49%	0.09%	0.51%	0.61%	2.94%	98.88%

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

BTSs Accumulated Downtime:

Videocon failed to meet the benchmark. Minimum BTS Accumulated downtime was recorded for Reliance CDMA at 0.03%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark with most of the operators recording 0.00% worst affected BTS due to downtime.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.49%.

SDCCH/ Paging Chl. Congestion:

All the operators met the benchmark on SDCCH / Paging Channel Congestion, while Airtel recorded the best SDCCH / Paging Channel Congestion at 0.04%.

TCH Congestion:

All the operators met the benchmark for TCH congestion, while Aircel performed the best with 0.00% TCH congestion.

Call Drop Rate:

All the operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance CDMA at 0.08%.

Worst Affected Cells Having More than 3% TCH Drop:

All the operators met the benchmark for the parameter. Best performance was recorded for Aircel 0.43%.

Voice Quality

All operators met the benchmark. Best performance was recorded for Tata CDMA at 99.22%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis 3 day live data.

4.2.1 3 DAY DATA - JANUARY FOR 2G

Name of Service Provider 3 Day January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.74%	0.00%	97.79%	0.03%	0.00%	0.56%	1.04%	99.20%
Airtel	0.10%	0.00%	98.84%	0.05%	0.50%	0.74%	1.66%	97.80%
BSNL	0.52%	0.29%	97.93%	0.55%	0.59%	1.01%	1.61%	NDR
Idea	3.45%	0.00%	97.26%	0.50%	1.41%	0.65%	1.41%	97.77%
Reliance CDMA	0.01%	0.00%	99.16%	NA	0.20%	0.06%	0.39%	99.02%
Reliance GSM	0.13%	0.00%	95.70%	0.10%	1.15%	0.20%	0.45%	98.50%
Tata CDMA	0.07%	0.00%	95.61%	NA	0.00%	0.33%	3.20%	99.20%
Tata GSM	0.06%	0.00%	98.46%	0.07%	0.04%	0.54%	1.84%	99.24%
Videocon	8.58%	0.23%	98.55%	0.10%	0.57%	0.59%	2.30%	98.47%
Vodafone	0.09%	0.00%	99.55%	0.11%	0.45%	0.64%	3.51%	98.87%

4.2.2   3 DAY DATA – FEBRUARY FOR 2G

	3 Day							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider 3 Day February	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.70%	0.00%	97.08%	0.81%	0.00%	0.60%	0.26%	99.85%
Airtel	0.12%	0.10%	98.93%	0.03%	0.34%	0.67%	1.61%	97.83%
BSNL	1.90%	0.94%	97.17%	0.36%	1.38%	1.15%	1.81%	NDR
Idea	0.07%	0.00%	97.18%	0.24%	1.48%	0.62%	1.22%	97.81%
Reliance CDMA	0.01%	0.00%	99.15%	NA	0.19%	0.08%	0.48%	99.01%
Reliance GSM	0.01%	1.06%	96.64%	0.05%	0.79%	0.15%	0.78%	98.56%
Tata CDMA	0.05%	0.00%	99.23%	NA	0.17%	0.22%	1.55%	99.23%
Tata GSM	0.07%	0.00%	99.43%	0.05%	0.03%	0.53%	1.62%	98.81%
Videocon	0.08%	0.00%	98.97%	0.11%	0.27%	0.58%	0.15%	98.65%
Vodafone	0.03%	0.00%	99.44%	0.07%	0.56%	0.55%	2.64%	98.90%

4.2.3   3 DAY DATA - MARCH FOR 2G

	3 Day							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider 3 Day March	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.10%	0.00%	96.75%	0.02%	0.00%	0.00%	0.00%	98.62%
Airtel	0.13%	0.00%	99.00%	0.05%	0.44%	0.65%	1.56%	98.00%
BSNL	1.93%	0.00%	97.12%	0.38%	1.22%	1.20%	1.80%	NDR
Idea	0.07%	0.00%	96.96%	0.30%	1.63%	0.56%	1.04%	97.92%
Reliance CDMA	0.06%	0.00%	98.99%	NA	0.28%	0.09%	0.44%	98.99%
Reliance GSM	0.24%	0.79%	96.20%	0.09%	0.79%	0.18%	0.67%	98.45%
Tata CDMA	0.23%	0.00%	98.89%	NA	0.00%	0.32%	1.55%	99.23%
Tata GSM	0.07%	0.00%	99.39%	0.05%	0.10%	0.50%	1.62%	98.91%
Videocon	0.11%	0.00%	98.93%	0.12%	0.26%	0.63%	0.17%	98.56%
Vodafone	0.02%	0.00%	99.47%	0.10%	0.53%	0.58%	2.67%	98.87%

4.3 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.15%	0.42%	99.80%	0.02%	0.07%	0.30%	2.05%	99.84%
BSNL 3G	1.57%	1.36%	97.33%	0.75%	0.38%	0.38%	1.58%	NA
Idea 3G	0.83%	0.08%	99.59%	0.08%	0.09%	0.68%	1.87%	99.45%
Tata 3G	0.07%	0.00%	98.20%	0.38%	0.85%	0.36%	1.97%	99.73%

Node Bs downtime:

All operators met the benchmark. Best performance was recorded by Tata 3G with 0.07% downtime.

Worst affected Node Bs due to downtime:

All the operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Tata 3G at 0.00%.

Call Set-up Success Rate (CSSR):

All the operators met the benchmark for CSSR. The maximum CSSR was observed for Airtel 3G with 99.80%.

RRC Congestion:

All the operators met the benchmark for RRC Congestion. The minimum RRC Congestion was observed for Airtel 3G with 0.02%.

Circuit Switched RAB Congestion:

All operators met the benchmark for the parameter. Minimum Circuit Switched RAB Congestion was recorded for Airtel 3G at 0.07%.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Airtel 3G at 0.30%.

Worst affected cells having more than 3% Circuit switched voice drop rate:

All operators met the benchmark for the parameter. Best performance was recorded for BSNL 3G at 1.58%.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for Airtel 3G at 99.84%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis PMR data.

4.3.1   PMR DATA - JANUARY FOR 3G

Month								
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month January	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.14%	0.57%	99.76%	0.03%	0.12%	0.35%	2.30%	99.94%
BSNL 3G	1.49%	1.33%	96.61%	0.92%	0.73%	0.39%	1.59%	NDR
Idea 3G	2.41%	0.04%	99.57%	0.11%	0.11%	0.72%	1.94%	100.00%
Tata 3G	0.08%	0.00%	97.61%	0.59%	1.16%	0.40%	2.12%	99.72%

4.3.2   PMR DATA – FEBRUARY FOR 3G

Month								
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month February	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.13%	0.23%	99.85%	0.01%	0.04%	0.30%	2.07%	99.90%
BSNL 3G	1.58%	1.42%	97.69%	0.64%	0.18%	0.38%	1.53%	NDR
Idea 3G	0.06%	0.08%	99.57%	0.09%	0.09%	0.72%	2.04%	99.19%
Tata 3G	0.06%	0.00%	98.22%	0.28%	0.93%	0.37%	1.95%	99.73%

4.3.3   PMR DATA - MARCH FOR 3G

Month								
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month March	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.18%	0.46%	99.80%	0.01%	0.05%	NA	NA	99.71%
BSNL 3G	1.65%	1.32%	97.70%	0.68%	0.22%	0.37%	1.63%	NDR
Idea 3G	0.06%	0.11%	99.64%	0.05%	0.08%	0.60%	1.64%	99.19%
Tata 3G	0.06%	0.00%	98.77%	0.28%	0.47%	0.33%	1.85%	99.74%

4.4   3 DAY DATA – CONSOLIDATED FOR 3G

A three day live measurement was conducted to measure the QoS provided by the operators. The table provided below gives a snapshot of the performance of all operators during live measurement.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.11%	0.00%	99.84%	0.01%	0.05%	0.30%	2.01%	99.84%
BSNL 3G	1.40%	0.40%	96.94%	0.75%	0.35%	0.43%	1.70%	NA
Idea 3G	0.64%	0.00%	99.64%	0.06%	0.08%	0.75%	1.94%	99.21%
Tata 3G	0.04%	0.00%	98.21%	0.39%	0.78%	0.37%	1.23%	99.73%

Node Bs downtime:

All operators met the benchmark for the parameter. Best performance was recorded for Tata 3G at 0.04%.

Worst affected Node Bs due to downtime:

All the operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Airtel 3G, Idea 3G and Tata 3G at 0.00%.

Call Set-up Success Rate (CSSR):

All the operators met the benchmark for CSSR. The maximum CSSR was observed for Airtel 3G with 99.84%.

RRC Congestion:

All the operators met the benchmark for RRC Congestion. The minimum RRC Congestion was observed for Airtel 3G with 0.01%.

Circuit Switched RAB Congestion:

All operators met the benchmark for the parameter. Minimum Circuit Switched RAB Congestion was recorded for Airtel 3G at 0.05%.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Airtel 3G at 0.30%.

Worst affected cells having more than 3% Circuit switched voice drop rate:

All operators met the benchmark for the parameter. Best performance was recorded for Tata 3G at 1.23%.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for Airtel 3G at 99.84%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis 3 day live data.

4.4.1 3 DAY DATA - JANUARY FOR 3G

Name of Service Provider 3 Day January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.08%	0.00%	99.86%	0.01%	0.05%	0.33%	1.96%	99.95%
BSNL 3G	0.56%	0.63%	96.13%	0.88%	0.64%	0.60%	2.26%	NDR
Idea 3G	1.80%	0.00%	99.63%	0.09%	0.10%	0.82%	1.93%	99.24%
Tata 3G	0.02%	0.00%	97.66%	0.66%	1.10%	0.41%	1.84%	99.71%

4.4.2 3 DAY DATA – FEBRUARY FOR 3G

Name of Service Provider 3 Day February	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.12%	0.00%	99.86%	0.02%	0.07%	0.31%	1.88%	99.94%
BSNL 3G	1.64%	0.71%	97.26%	0.65%	0.24%	0.38%	1.52%	NDR
Idea 3G	0.12%	0.00%	99.64%	0.08%	0.09%	0.68%	1.81%	99.19%
Tata 3G	0.04%	0.00%	98.12%	0.26%	0.80%	0.38%	1.03%	99.73%

4.4.3 3 DAY DATA - MARCH FOR 3G

Name of Service Provider 3 Day March	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NA	NA	99.79%	0.01%	0.04%	NA	NA	99.71%
BSNL 3G	1.52%	0.00%	97.44%	0.73%	0.17%	0.37%	1.62%	NDR
Idea 3G	0.04%	0.00%	99.66%	0.02%	0.03%	0.75%	2.06%	99.20%
Tata 3G	0.07%	0.00%	98.84%	0.25%	0.44%	0.34%	0.88%	99.74%

4.5 WIRELESS DATA PMR & 3 DAY LIVE – CONSOLIDATED FOR 2G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel	86.67%	95.42%	4.87%	NDR	99.67%	3.63%
Airtel	NDR	98.71%	3.58%	NDR	NDR	NDR
BSNL	NDR	NDR	NDR	NDR	95.27%	NDR
Idea	100.01%	98.05%	0.97%	100.00%	98.93%	0.88%
Reliance CDMA	99.99%	NDR	NDR	NDR	NDR	NDR
Reliance GSM	NDR	99.82%	4.25%	NDR	NDR	NDR
Tata CDMA	95.83%	NDR	NDR	NDR	NDR	NDR
Tata GSM	100.00%	99.78%	1.86%	NDR	NDR	NDR
Videocon	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	NDR	NDR	NDR	NDR	NDR	NDR

NDR: No data received from operators

Following are the parameter wise observations for wireless operators for MPCG circle:

Activation done within 4 hours:

Aircel failed to meet the benchmark as per PMR data while all other operators met the benchmark for activation done within 4 hours as per audit as well as live measurement.

PDP Context activation success rate:

All operators met the benchmark for PDP context activation success rate for as per audit as well as live measurement.

Drop Rate:

All operators met the benchmark for drop rate as per audit as well as live measurement.

4.6   WIRELESS DATA PMR & 3 DAY LIVE – CONSOLIDATED FOR 3G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Airtel 3G	NDR	99.47%	0.06%	NDR	NDR	NDR
BSNL 3G	NDR	NDR	NDR	NDR	95.94%	3.02%
Idea 3G	NDR	98.77%	0.75%	NDR	98.86%	0.76%
Tata 3G	NDR	99.98%	1.95%	NDR	NDR	NDR

NDR: No data received

Following are the parameter wise observations for wireless operators for MPCG circle:

Activation done within 4 hours:

No data for 3G activation available for any of the operators.

PDP Context activation success rate:

All operators met the benchmark for PDP context activation success rate for as per audit as well as live measurement.

Drop Rate:

All operators met the benchmark for drop rate as per audit as well as live measurement.

Below are the month wise summary tables for each network parameter basis PMR and Live data.

4.7   LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing		Response time to customer for assistance		Level 1 Service	Service Requests
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to	Call answered	Complaint /Request attended to Satisfaction
Benchmark	98%	100%	≥ 95%	≥ 95%	≥ 95%	
Aircel	NA	NA	100.00%	100.00%	73.33%	NA
Airtel	73.00%	100.00%	100.00%	100.00%	100.00%	84.00%
BSNL	84.00%	100.00%	100.00%	100.00%	100.00%	75.00%
Idea	73.00%	100.00%	100.00%	100.00%	100.00%	75.00%
Reliance CDMA	92.00%	92.00%	100.00%	100.00%	100.00%	70.00%
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	86.00%
Tata CDMA	NA	NA	100.00%	100.00%	78.00%	NA
Tata GSM	58.06%	58.06%	100.00%	100.00%	52.67%	37.25%
Videocon	100.00%	100.00%	100.00%	100.00%	52.67%	76.60%
Vodafone	70.69%	70.69%	100.00%	100.00%	43.67%	NA

NA- Not applicable

Resolution of billing complaints

As per the consumers (live calling exercise) only Reliance GSM and Videocon were able to meet the benchmark of resolving 98% complaints within 4 weeks.

The benchmark for resolving 100% complaints within 6 weeks was not met by Reliance CDMA, Tata GSM and Vodafone.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all operators met the benchmark of 95% with all operators recording 100% for the parameter.

Customer Care / Helpline Assessment (voice to voice)

All operators met the benchmark of answering 95% voice to voice calls within 90 seconds. All operators recorded 100% for the parameter.

Level 1 Service

As per the live calling results, Aircel, Tata CDMA, Tata GSM, Videocon and Vodafone failed to meet the TRAI benchmark for level 1 service.

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests.

4.8   BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Billing Complaints		Response time to customer for assistance	Customer care	
	Postpaid Subscribers	Prepaid Subscribers	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	% of cases where credit/wavier is received within one week	Percentage of calls answered by the IVR	Percentage of calls answered by the operators (voice to
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel	0.00%	0.00%	NA	NA	NA	98.20%	99.86%
Airtel	0.17%	0.01%	100.00%	100.00%	100.00%	100.00%	82.25%
BSNL	0.02%	0.05%	99.88%	100.00%	100.00%	99.84%	98.44%
Idea	0.49%	0.14%	100.00%	100.00%	100.00%	95.08%	96.86%
Reliance CDMA	0.09%	0.03%	100.00%	100.00%	100.00%	97.44%	86.06%
Reliance GSM	0.09%	0.03%	100.00%	100.00%	100.00%	97.55%	92.18%
Tata CDMA	0.00%	0.00%	NA	NA	NA	100.00%	99.52%
Tata GSM	0.00%	0.00%	100.00%	100.00%	100.00%	97.70%	94.28%
Videocon	NA	0.00%	100.00%	100.00%	100.00%	100.00%	96.84%
Vodafone	0.24%	0.07%	100.00%	100.00%	100.00%	100.00%	99.27%

Metering and Billing Credibility – Post-paid Subscribers

For the billing disputes of post-paid subscribers, it was observed that Airtel, Idea and Vodafone failed to meet the TRAI benchmark for the parameter. Aircel and Tata GSM & CDMA had the best performance with 0.00% billing disputes.

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, Idea failed to meet the benchmark of charging disputes. Aircel, Tata CDMA and GSM and Videocon performed the best with 0.00% disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks respectively.

Response Time to customer for assistance - % of cases in which advance waiver is received within one week

All the operators met the TRAI benchmark of providing credit or waiver within one week in case of complaints received.

Customer Care Percentage of calls answered by the IVR

All the operators met the TRAI benchmark of answering 95% IVR calls.

Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds

Airtel, Reliance CDMA & GSM and Tata GSM did not meet the benchmark of answering 95% calls within 90 seconds.

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4.9   INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment										
Inter operator call Assessment To↓ From→	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Aircel	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Airtel	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Idea	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Reliance CDMA	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%
Tata CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Tata GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%
Videocon	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA

Maximum Problem faced by the calling operator to other operator. The orange colour denotes performance below circle average.

In the inter-operator call assessment, most of the operators did not face any problems in connecting to other operators.

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4.10 PMR COMPARISON WITH IMRB AND OPERATORS DATA 2G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	BTSs Accumulated downtime (not available for service)		Worst affected BTSs due to downtime		Call Set-up Success Rate		SDCCH/ Paging Chl. Congestion		TCH Congestion		Call drop rate		Worst affected cells having more than 3%		Connection with good voice quality			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Aircel	0.36%	0.36%	1.04%	1.04%	97.91%	97.91%	0.37%	0.37%	0.00%	0.00%	0.69%	0.70%	0.52%	0.52%	98.95%	98.93%	0.00%	0.00%
Airtel	0.12%	0.13%	0.20%	0.28%	98.90%	98.92%	0.05%	0.07%	0.48%	0.50%	0.70%	0.69%	1.60%	1.59%	97.85%	97.89%	0.00%	0.00%
BSNL	1.83%	1.89%	1.69%	1.44%	97.11%	96.94%	0.48%	0.43%	1.12%	1.28%	1.07%	1.18%	2.37%	1.77%	97.06%	NA	0.00%	0.00%
Idea	0.09%	1.59%	0.27%	0.27%	97.21%	97.21%	0.38%	0.38%	1.42%	1.42%	0.61%	0.61%	1.23%	1.23%	97.84%	97.84%	0.00%	0.00%
RCOM CDMA	0.02%	0.02%	0.06%	0.06%	99.06%	99.06%	0.00%	NA	0.23%	0.23%	0.07%	0.07%	0.50%	0.49%	98.96%	NA	0.00%	0.00%
RTL	0.29%	0.28%	1.27%	1.28%	96.33%	96.33%	0.08%	0.08%	0.80%	0.80%	0.18%	0.18%	0.63%	0.63%	98.51%	98.51%	0.00%	0.00%
TATA CDMA	0.17%	0.17%	0.16%	0.00%	99.00%	97.73%	0.00%	NA	0.09%	0.03%	0.24%	0.26%	2.75%	2.84%	99.21%	99.24%	0.00%	0.00%
TATA GSM	0.10%	0.08%	0.04%	0.02%	99.12%	99.12%	0.08%	0.08%	0.06%	0.06%	0.52%	0.53%	2.25%	2.21%	98.91%	98.91%	0.00%	0.00%
Videocon	0.11%	2.37%	0.31%	0.31%	98.34%	98.34%	0.20%	0.20%	0.60%	0.66%	0.67%	0.67%	2.51%	2.51%	98.35%	98.34%	0.00%	0.00%
Vodafone	0.07%	0.07%	0.10%	0.10%	99.44%	99.44%	0.18%	0.18%	0.56%	0.56%	0.57%	0.57%	2.93%	2.93%	98.89%	98.89%	0.00%	0.00%

4.11 PMR COMPARISON WITH IMRB AND OPERATORS DATA 3G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	Node Bs downtime (not available for service)		Worst affected Node Bs due to downtime		CSSR		RRC Congestion		Circuit Switched RAB Congestion		Call drop rate		Worst affected cells having more than 3% Circuit switched		%Circuit Switch Voice Quality (CSV quality)			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Airtel 3G	0.14%	0.15%	0.40%	0.42%	99.80%	99.80%	0.02%	0.02%	0.08%	0.07%	0.32%	0.30%	2.15%	2.05%	99.95%	99.84%	0.00%	0.00%
BSNL 3G	1.65%	1.57%	1.47%	1.36%	96.83%	97.33%	0.77%	0.75%	0.70%	0.38%	0.42%	0.38%	2.07%	1.58%	96.55%	NA	0.00%	0.00%
Idea 3G	0.05%	0.83%	0.07%	0.08%	99.59%	99.59%	0.08%	0.08%	0.09%	0.09%	0.68%	0.68%	1.87%	1.87%	99.19%	99.45%	0.00%	0.00%
Tata 3G	0.06%	0.07%	0.00%	0.00%	98.17%	98.20%	0.40%	0.38%	0.86%	0.85%	0.36%	0.36%	1.95%	1.97%	99.73%	99.73%	0.00%	0.00%

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5   CRITICAL FINDINGS

PMR Consolidated 2G (Network Parameters)

➢ Videocon failed to meet the benchmark for BTS Accumulated downtime.

Wireless Data Services 2G & 3G

➢ Aircel failed to meet the benchmark for Activation within 4 hours for 2G.
➢ Data for most of the parameters for wireless data services was not submitted by most of the operators, stating technical challenges at their end.

Live Calling

➢ Only Reliance GSM and Videocon were able to meet the benchmark of resolving 98% complaints within 4 weeks.
➢ The benchmark for resolving 100% complaints within 6 weeks was not met by Reliance CDMA, Tata GSM and Vodafone.
➢ Aircel, Tata CDMA, Tata GSM, Videocon and Vodafone failed to meet the TRAI benchmark for level 1 service.

Metering and billing credibility

➢ For the billing disputes of post-paid subscribers, it was observed that Airtel, Idea and Vodafone failed to meet the TRAI benchmark for the parameter.
➢ For the prepaid customers, Idea failed to meet the benchmark of charging disputes.
➢ Airtel, Reliance CDMA & GSM and Tata GSM did not meet the benchmark of answering 95% calls within 90 seconds.

Drive Test (Operator Assisted)

➢ Aircel 2G failed to meet the benchmark for call drop rate in Damoh SSA
➢ BSNL 3G failed to meet the benchmark in outdoor locations in Damoh SSA.
➢ Reliance GSM failed to meet the benchmark in outdoor locations in Itarsi SSA
➢ BSNL 3G failed to meet the benchmark in outdoor locations in Itarsi SSA.
➢ Reliance GSM failed to meet the benchmark in outdoor locations in Sagar SSA.
➢ BSNL 3G failed to meet the benchmark in outdoor locations in Sagar SSA.
➢ Reliance GSM failed to meet the benchmark in outdoor locations in Bilaspur SSA.
➢ BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations in Mandsaur SSA.
➢ BSNL 3G failed to meet the benchmark in indoor locations in Mandsaur SSA.
➢ BSNL 3G failed to meet the benchmark in outdoor locations in Mandsaur SSA
➢ BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations in Sajapur SSA
➢ BSNL 3G failed to meet the benchmark in outdoor locations in Sajapur SSA
➢ BSNL 3G failed to meet the benchmark in outdoor locations in Balaghat SSA
➢ Reliance GSM failed to meet the benchmark in outdoor locations in Betul SSA
➢ BSNL 3G failed to meet the benchmark in outdoor as well as indoor locations in Betul SSA.

Drive Test (Independent)

➢ Airtel 2G & 3G, BSNL 2G & 3G, TATA GSM, Videocon 2G and Vodafone 2G failed to meet the benchmark for voice quality in Indore city.

➢ Airtel 2G, BSNL 3G, Reliance GSM & 3G, Tata 3G and Videocon failed to meet the benchmark for CSSR in Indore city.

➢ Airtel 3G, BSNL 2G & 3G, Idea 2G & 3G, Reliance GSM & 3G, Tata GSM & 3G and Videocon failed to meet the benchmark for call drop rate in Indore city

6 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 2G

6.1 BTS ACCUMULATED DOWNTIME

6.1.1 PARAMETER DESCRIPTION

⮕ The parameter of network availability would be measured from following sub-parameters

1. BTSs Accumulated downtime (not available for service)

2. Worst affected BTSs due to downtime

1. **Definition - BTSs (Base Transceiver Station) accumulated downtime** (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation. For measuring the performance against the benchmark for this parameter the downtime of each BTS lasting more than 1 hour at a time in a day during the period of a month were considered.

2. **Computation Methodology** –
   BTS accumulated downtime (not available for service) = **Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100**

3. **TRAI Benchmark** –

   a. BTSs Accumulated downtime (not available for service) ≤ 2%

4. **Audit Procedure** –

   ⮕ The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

   ⮕ All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

⊃ Any outage as a result of force majeure were not considered at the time of calculation

⊃ Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

⊃ List of operating sites with cell details and ids are taken from the operator.

⊃ When there is any outage a performance report gets generated in line with that cell resulting and master base of the Accumulated downtime and worst affected BTS due to downtime.

6.1.2   KEY FINDINGS - CONSOLIDATED

BTSs accumulated downtime - Consolidated

TRAI Benchmark ≤ 2%

Operator	PMR Data	Live Data
Aircel	0.36%	0.52%
Airtel	0.13%	0.11%
BSNL	1.89%	1.66%
Idea	1.59%	1.19%
Reliance CDMA	0.02%	0.03%
Reliance GSM	0.28%	0.13%
Tata CDMA	0.17%	0.12%
Tata GSM	0.08%	0.07%
Videocon	2.37%	2.91%
Vodafone	0.07%	0.04%
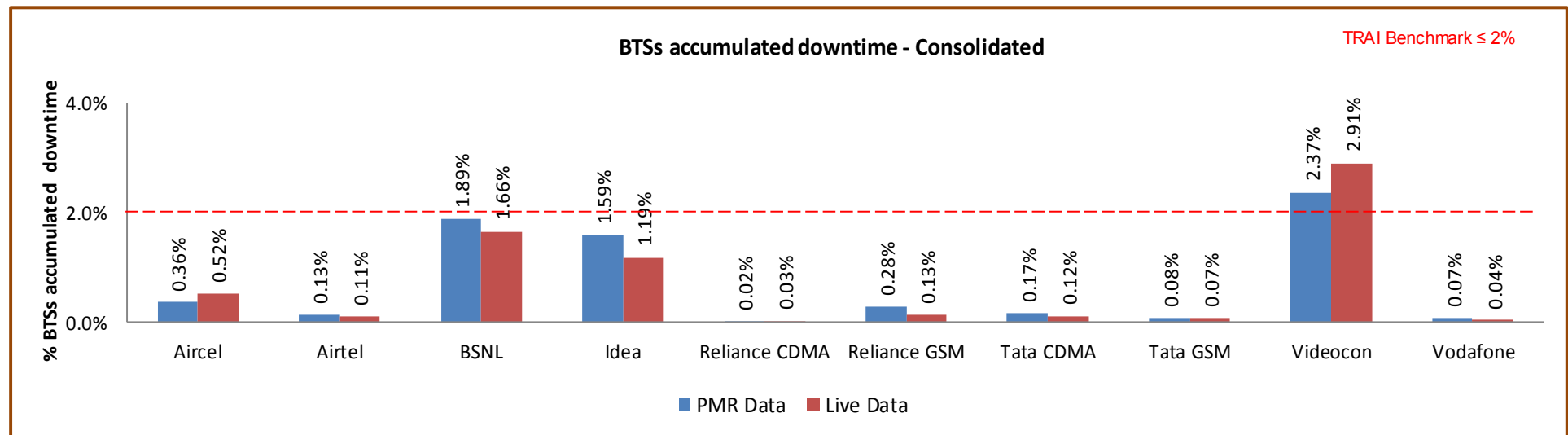
Data Source: Operations and Maintenance Center (OMC) of the operators

Videocon did not meet the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

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6.1.2.1 KEY FINDINGS – MONTH 1

BTSs accumulated downtime - Month 1

TRAI Benchmark ≤ 2%

% BTSs accumulated downtime

Operator	PMR Data	Live Data
Aircel	0.38%	0.74%
Airtel	0.11%	0.10%
BSNL	1.93%	0.52%
Idea	4.62%	3.45%
Reliance CDMA	0.01%	0.01%
Reliance GSM	0.24%	0.13%
Tata CDMA	0.15%	0.07%
Tata GSM	0.10%	0.06%
Videocon	6.94%	8.58%
Vodafone	0.08%	0.09%

■ PMR Data ■ Live Data
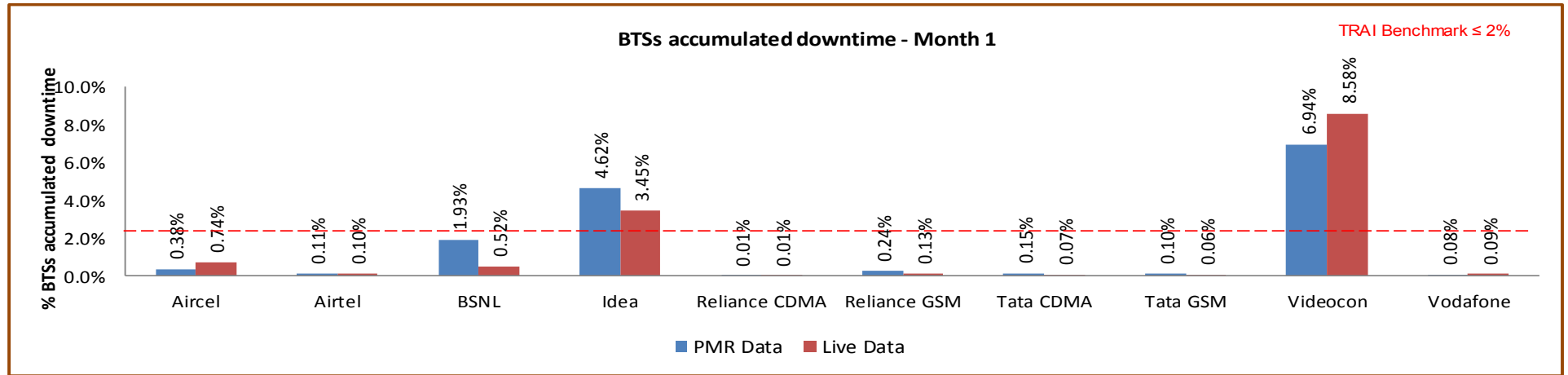
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.2 KEY FINDINGS – MONTH 2

BTSs accumulated downtime - Month 2

TRAI Benchmark ≤ 2%

% BTSs accumulated downtime

Operator	PMR Data	Live Data
Aircel	0.30%	0.70%
Airtel	0.11%	0.12%
BSNL	1.82%	1.90%
Idea	0.08%	0.07%
Reliance CDMA	0.02%	0.01%
Reliance GSM	0.24%	0.01%
Tata CDMA	0.15%	0.05%
Tata GSM	0.08%	0.07%
Videocon	0.10%	0.08%
Vodafone	0.04%	0.03%

■ PMR Data ■ Live Data
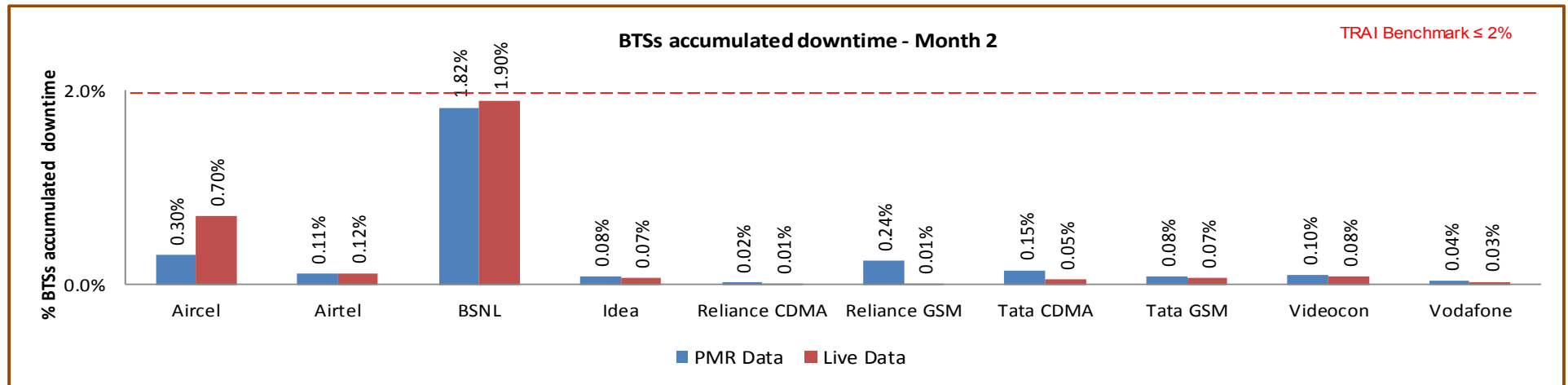
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.3   KEY FINDINGS – MONTH 3

BTSs accumulated downtime - Month 3

TRAI Benchmark ≤ 2%

Operator	PMR Data	Live Data
Aircel	0.39%	0.10%
Airtel	0.18%	0.13%
BSNL	1.92%	1.93%
Idea	0.11%	0.07%
Reliance CDMA	0.02%	0.06%
Reliance GSM	0.37%	0.24%
Tata CDMA	0.20%	0.23%
Tata GSM	0.06%	0.07%
Videocon	0.12%	0.11%
Vodafone	0.09%	0.02%

■ PMR Data   ■ Live Data
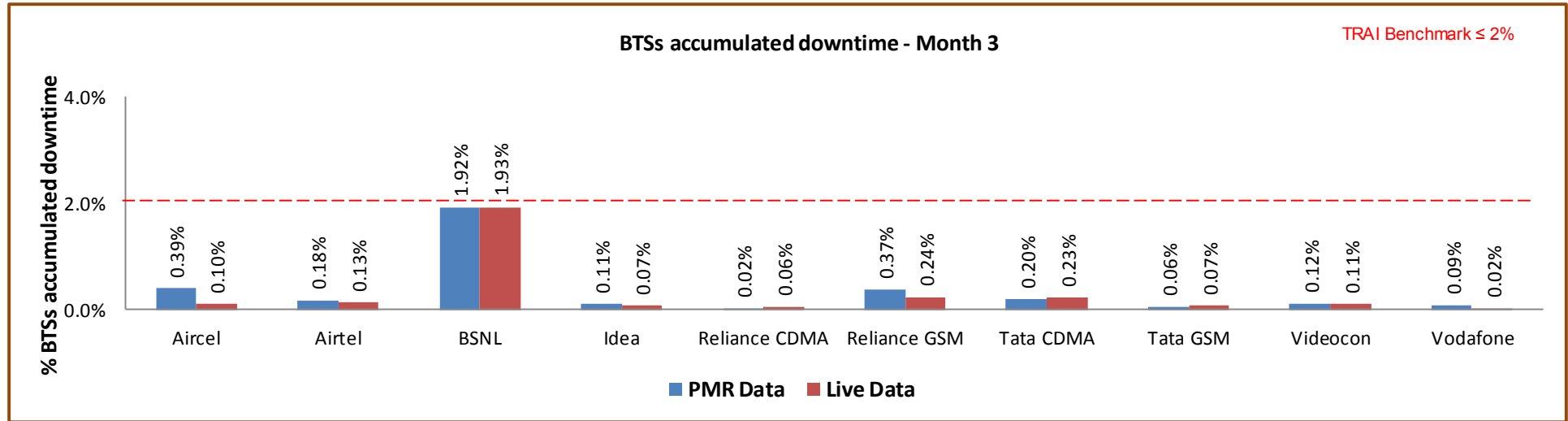
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2   WORST AFFECTED BTS DUE TO DOWNTIME

6.2.1   PARAMETER DESCRIPTION

- **Definition** – **Worst Affected BTS due to downtime** shall basically measure percentage of BTS having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.

  For measuring the parameter "Percentage of worst affected BTSs due to downtime" the downtime of each BTS lasting for more than 1 hour at a time in a day during the period of a month was considered.

- **Computation Methodology** –

  Worst affected BTSs due to downtime = (**Number of BTSs having accumulated downtime greater than 24 hours in a month** / **Number of BTS in Licensed Service Area) * 100**

- **TRAI Benchmark** –

  a. Worst affected BTSs due to downtime ≤ 2%

- **Audit Procedure** –

  i.   The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

  ii.   All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  iv.   Any outage as a result of force majeure was not considered at the time of calculation.

  v.   List of operating sites with cell details and ids are taken from the operator.

  vi.   All the BTS having down time greater than 24 hours is assessed and values of BTS accumulated downtime is computed in accordance.

6.2.2   KEY FINDINGS – CONSOLIDATED
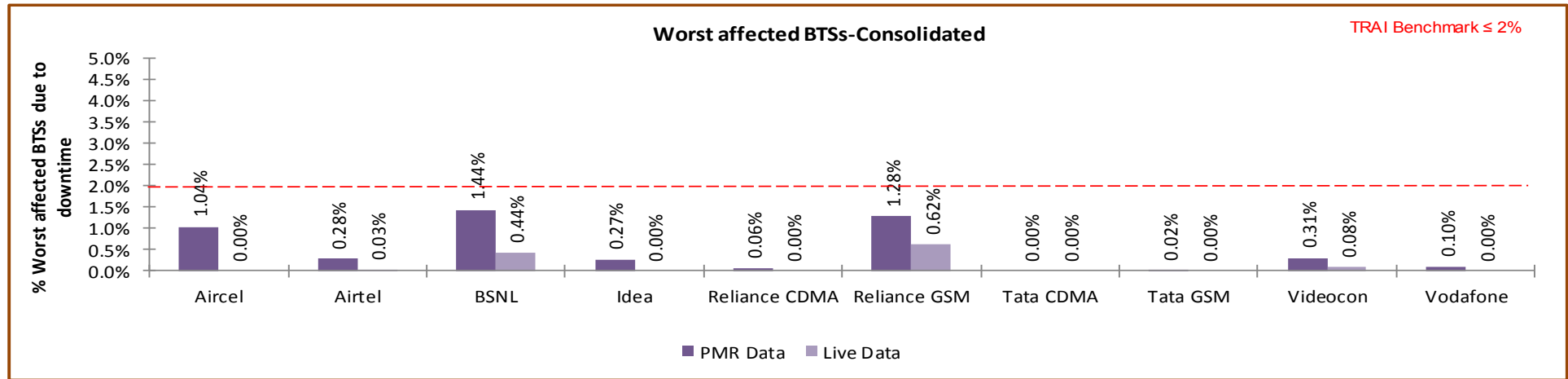
Worst affected BTSs-Consolidated

TRAI Benchmark ≤ 2%

Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

6.2.2.1   KEY FINDINGS – MONTH 1

Worst affected BTSs-Month 1

TRAI Benchmark ≤ 2%
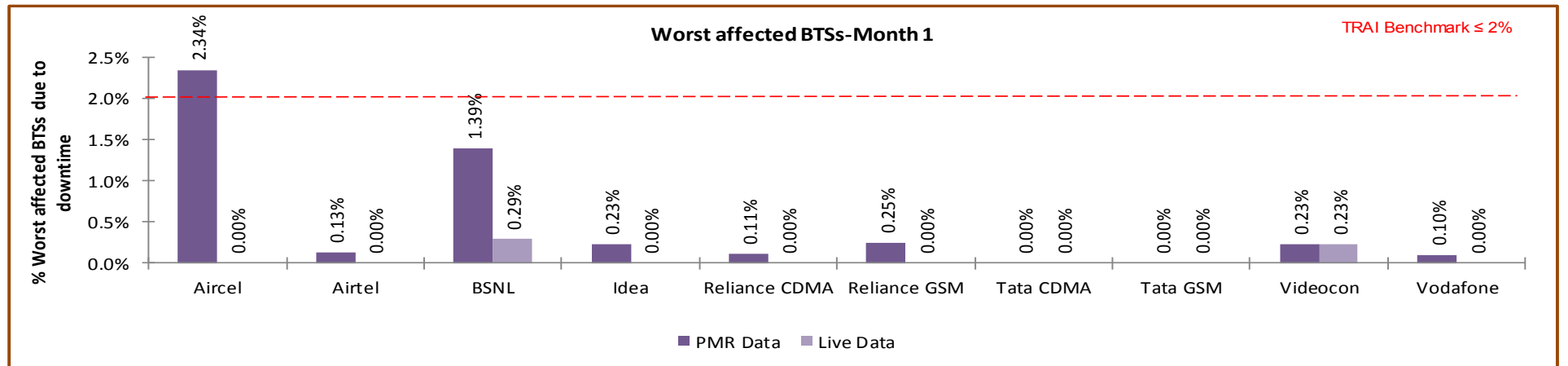
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.2 KEY FINDINGS – MONTH 2

Worst affected BTSs-Month 2

TRAI Benchmark ≤ 2%

Y-axis: % Worst affected BTSs due to downtime

Operator	PMR Data	Live Data
Aircel	0.00%	0.00%
Airtel	0.19%	0.10%
BSNL	1.45%	0.94%
Idea	0.20%	0.00%
Reliance CDMA	0.06%	0.00%
Reliance GSM	1.70%	1.06%
Tata CDMA	0.00%	0.00%
Tata GSM	0.02%	0.00%
Videocon	0.29%	0.00%
Vodafone	0.09%	0.00%

■ PMR Data ■ Live Data

6.2.2.3 KEY FINDINGS – MONTH 3

Worst affected BTSs-Month 3

TRAI Benchmark ≤ 2%

Y-axis: % Worst affected BTSs due to downtime

Operator	PMR Data	Live Data
Aircel	0.78%	0.00%
Airtel	0.51%	0.00%
BSNL	1.47%	0.00%
Idea	0.39%	0.00%
Reliance CDMA	0.00%	0.00%
Reliance GSM	1.87%	0.79%
Tata CDMA	0.00%	0.00%
Tata GSM	0.03%	0.00%
Videocon	0.40%	0.00%
Vodafone	0.12%	0.00%

■ PMR Data ■ Live Data

Data Source: Operations and Maintenance Center (OMC) of the operators

6.3   CALL SET UP SUCCESS RATE

6.3.1   PARAMETER DESCRIPTION

1. **Definition:** The ratio of successful calls established to total calls is known as Call Set-Up Success Rate (CSSR).
2. **Computation Methodology-**

   (Calls Established / Total Call Attempts) * 100

   Call Established means the following events have happened in call setup:-

   - call attempt is made

   - the TCH is allocated

   - the call is routed to the outward path of the concerned MSC

3. **TRAI Benchmark ≥** 95%
4. **Audit Procedure –**

   - The cell-wise data generated through counters/ MMC available in the switch for traffic measurements

   - CSSR calculation should be measured using OMC generated data only

   - Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week

   - Counter data is extracted from the NOC of the operators.

   - Total calls established include all calls established excluding Signaling blocking, TCH Drop and TCH blocking.

   - The numerator and denominator values are derived from adding the counter values from the MSC.

6.3.2   KEY FINDINGS - CONSOLIDATED
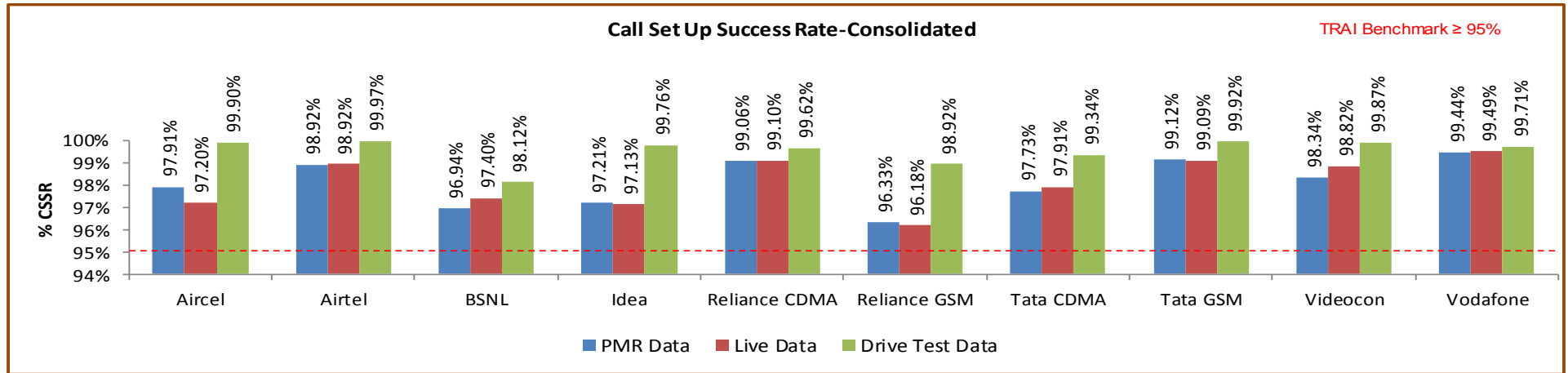
Call Set Up Success Rate-Consolidated

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	97.91%	97.20%	99.90%
Airtel	98.92%	98.92%	99.97%
BSNL	96.94%	97.40%	98.12%
Idea	97.21%	97.13%	99.76%
Reliance CDMA	99.06%	99.10%	99.62%
Reliance GSM	96.33%	96.18%	98.92%
Tata CDMA	97.73%	97.91%	99.34%
Tata GSM	99.12%	99.09%	99.92%
Videocon	98.34%	98.82%	99.87%
Vodafone	99.44%	99.49%	99.71%

Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for both PMR and Live data.

6.3.2.1   KEY FINDINGS – MONTH 1

Call Set Up Success Rate-Month 1

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	98.06%	97.79%	99.53%
Airtel	98.82%	98.84%	100.00%
BSNL	97.14%	97.93%	99.43%
Idea	97.33%	97.26%	99.88%
Reliance CDMA	99.15%	99.16%	100.00%
Reliance GSM	96.20%	95.70%	99.26%
Tata CDMA	95.15%	95.61%	NA
Tata GSM	98.54%	98.46%	99.82%
Videocon	98.43%	98.55%	99.63%
Vodafone	99.46%	99.55%	99.94%

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6.3.2.2   KEY FINDINGS – MONTH 2

Call Set Up Success Rate-Month 2

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	97.62%	97.08%	100.00%
Airtel	98.96%	98.93%	99.93%
BSNL	96.79%	97.17%	99.14%
Idea	97.04%	97.18%	99.87%
Reliance CDMA	98.95%	99.15%	99.92%
Reliance GSM	96.52%	96.64%	99.76%
Tata CDMA	99.12%	99.23%	100.00%
Tata GSM	99.41%	99.43%	99.85%
Videocon	98.21%	98.97%	99.92%
Vodafone	99.47%	99.44%	100.00%

■ PMR Data   ■ Live Data   ■ Drive Test Data

6.3.2.3   KEY FINDINGS – MONTH 3

Call Set Up Success Rate-Month 3

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	98.05%	96.75%	100.00%
Airtel	98.96%	99.00%	99.97%
BSNL	96.91%	97.12%	96.96%
Idea	97.25%	96.96%	99.62%
Reliance CDMA	99.08%	98.99%	99.32%
Reliance GSM	96.26%	96.20%	98.42%
Tata CDMA	98.93%	98.89%	98.47%
Tata GSM	99.42%	99.39%	100.00%
Videocon	98.39%	98.93%	99.97%
Vodafone	99.40%	99.47%	99.45%

■ PMR Data   ■ Live Data   ■ Drive Test Data

Data Source: Network Operations Center (NOC) of the operators

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6.4   NETWORK CHANNEL CONGESTION- PAGING CHANNEL /TCH CONGESTION/POI

6.4.1   PARAMETER DESCRIPTION

1. **Definition:** It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:

   - SDCCH Level: Stand-alone dedicated control channel

   - TCH Level: Traffic Channel

   - POI Level: Point of Interconnect

2. **Computational Methodology:**

   - **SDCCH / TCH Congestion% = $[(A_1 \times C_1) + (A_2 \times C_2) + ... + (A_n \times C_n)] / (A_1 + A_2 + ... + A_n)$**

     - Where:-A_1 = Number of attempts to establish SDCCH / TCH made on day 1

     - C_1 = Average SDCCH / TCH Congestion % on day 1

     - A_2 = Number of attempts to establish SDCCH / TCH made on day 2

     - C_2 = Average SDCCH / TCH Congestion % on day 2

     - A_n = Number of attempts to establish SDCCH / TCH made on day n

     - C_n = Average SDCCH / TCH Congestion % on day n

   - **POI Congestion% = $[(A_1 \times C_1) + (A_2 \times C_2) + ... + (A_n \times C_n)] / (A_1 + A_2 + ... + A_n)$**

     - Where:-A_1 = POI traffic offered on all POIs (no. of calls) on day 1

     - C_1 = Average POI Congestion % on day 1

     - A_2 = POI traffic offered on all POIs (no. of calls) on day 2

     - C_2 = Average POI Congestion % on day 2

- An = POI traffic offered on all POIs (no. of calls) on day n

- Cn = Average POI Congestion % on day n

3. **Benchmark:**

   ↳ SDCCH Congestion: ≤ 1%, TCH Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

4. **Audit Procedure** –

   ↳ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) would be conducted

   ↳ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

6.4.2   KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)
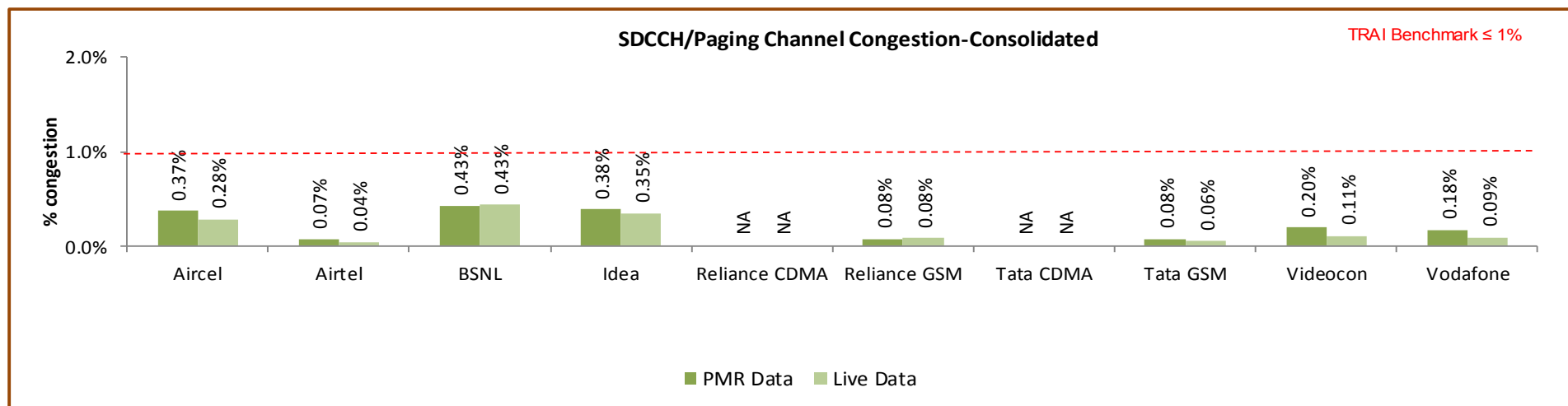
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark as per PMR/audit data.

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

6.4.2.1 KEY FINDINGS – MONTH 1

SDCCH/Paging Channel Congestion-Month 1

TRAI Benchmark ≤ 1%

Operator	PMR Data	Live Data
Aircel	0.04%	0.03%
Airtel	0.05%	0.05%
BSNL	0.44%	0.55%
Idea	0.41%	0.50%
Reliance CDMA	NA	NA
Reliance GSM	0.08%	0.10%
Tata CDMA	NA	NA
Tata GSM	0.09%	0.07%
Videocon	0.11%	0.10%
Vodafone	0.13%	0.11%

% congestion

■ PMR Data ■ Live Data

6.4.2.2 KEY FINDINGS – MONTH 2

SDCCH/Paging Channel Congestion-Month 2

TRAI Benchmark ≤ 1%

Operator	PMR Data	Live Data
Aircel	0.64%	0.81%
Airtel	0.05%	0.03%
BSNL	0.33%	0.36%
Idea	0.34%	0.24%
Reliance CDMA	NA	NA
Reliance GSM	0.07%	0.05%
Tata CDMA	NA	NA
Tata GSM	0.07%	0.05%
Videocon	0.26%	0.11%
Vodafone	0.10%	0.07%

% congestion

■ PMR Data ■ Live Data

6.4.2.3   KEY FINDINGS – MONTH 3

SDCCH/Paging Channel Congestion-Month 3

TRAI Benchmark ≤ 1%

Operator	PMR Data	Live Data
Aircel	0.42%	0.02%
Airtel	0.11%	0.05%
BSNL	0.51%	0.38%
Idea	0.41%	0.30%
Reliance CDMA	NA	NA
Reliance GSM	0.08%	0.09%
Tata CDMA	NA	NA
Tata GSM	0.07%	0.05%
Videocon	0.23%	0.12%
Vodafone	0.30%	0.10%

■ PMR Data   ■ Live Data

Data Source: Network Operations Center (NOC) of the operators

6.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)
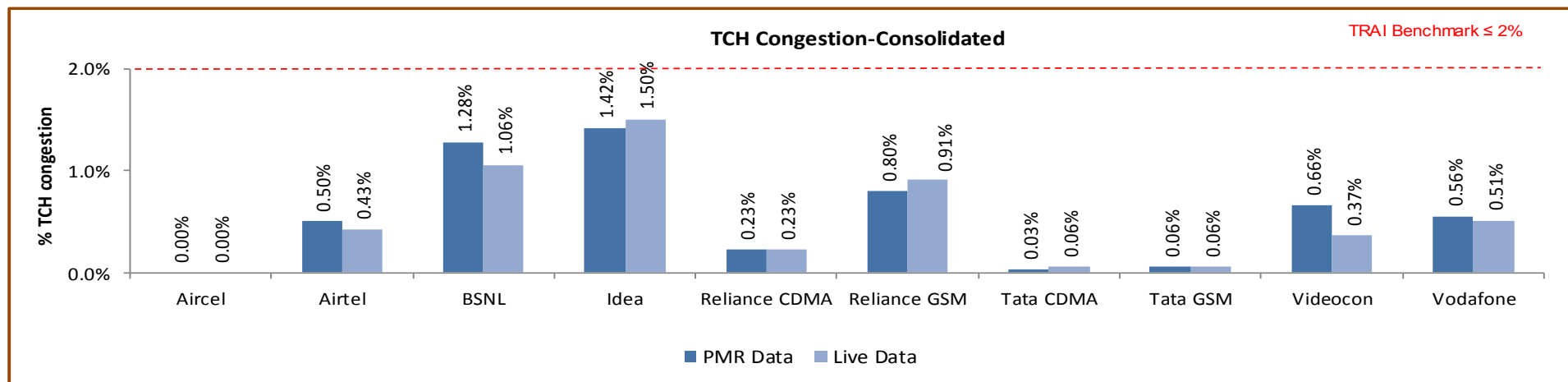
TCH Congestion-Consolidated

TRAI Benchmark ≤ 2%

% TCH congestion

Operator	PMR Data	Live Data
Aircel	0.00%	0.00%
Airtel	0.50%	0.43%
BSNL	1.28%	1.06%
Idea	1.42%	1.50%
Reliance CDMA	0.23%	0.23%
Reliance GSM	0.80%	0.91%
Tata CDMA	0.03%	0.06%
Tata GSM	0.06%	0.06%
Videocon	0.66%	0.37%
Vodafone	0.56%	0.51%

■ PMR Data ■ Live Data

Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for both PMR and Live data.

6.4.3.1 KEY FINDINGS – MONTH 1

TCH Congestion-Month 1

TRAI Benchmark ≤ 2%

% TCH congestion

Operator	PMR Data	Live Data
Aircel	0.00%	0.00%
Airtel	0.45%	0.50%
BSNL	1.23%	0.59%
Idea	1.32%	1.41%
Reliance CDMA	0.22%	0.20%
Reliance GSM	0.87%	1.15%
Tata CDMA	0.00%	0.00%
Tata GSM	0.03%	0.04%
Videocon	0.58%	0.57%
Vodafone	0.54%	0.45%

■ PMR Data ■ Live Data

6.4.3.2   KEY FINDINGS – MONTH 2

TCH Congestion-Month 2

TRAI Benchmark ≤ 2%

% TCH congestion

Operator	PMR Data	Live Data
Aircel	0.00%	0.00%
Airtel	0.48%	0.34%
BSNL	1.33%	1.38%
Idea	1.51%	1.48%
Reliance CDMA	0.22%	0.19%
Reliance GSM	0.81%	0.79%
Tata CDMA	0.10%	0.17%
Tata GSM	0.06%	0.03%
Videocon	0.80%	0.27%
Vodafone	0.53%	0.56%

■ PMR Data   ■ Live Data

6.4.3.3   KEY FINDINGS – MONTH 3

TCH Congestion-Month 3

TRAI Benchmark ≤ 2%

% TCH congestion

Operator	PMR Data	Live Data
Aircel	0.00%	0.00%
Airtel	0.58%	0.44%
BSNL	1.28%	1.22%
Idea	1.42%	1.63%
Reliance CDMA	0.23%	0.28%
Reliance GSM	0.73%	0.79%
Tata CDMA	0.00%	0.00%
Tata GSM	0.09%	0.10%
Videocon	0.61%	0.26%
Vodafone	0.60%	0.53%

■ PMR Data   ■ Live Data

Data Source: Network Operations Center (NOC) of the operators

6.4.4 KEY FINDINGS – POI CONGESTION (CONSOLIDATED) – AVERAGE OF 3 MONTHS

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		51	279	459	810	133	446	162	162	110	132
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		6551	796863	555395	768190	57603	318602	132479	132479	59965	219858
Traffic served for all POIs (B)- in erlangs		2	524743	96638	314706	43008	171090	70719	70719	42105	183579
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		51	279	367	810	134	450	162	162	109	132
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		6551	788790	433676	502309	56417	322889	132479	132479	60076	383959
Traffic served for all POIs (B)- in erlangs		2	480997	93042	295714	44928	169527	70719	70719	27316	279534
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark of POI Congestion as per PMR/audit Data.

6.4.4.1   KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-January											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	93	153	276	43	146	54	54	36	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	263746	185005	437044	22065	107022	43629	43629	20035	83558
Traffic served for all POIs (B)- in erlangs		1	156024	31351	102989	10364	51424	23302	23302	12657	50520
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	93	61	276	44	150	54	54	36	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	263747	63286	164943	23183	109183	43629	43629	20147	247993
Traffic served for all POIs (B)- in erlangs		1	153407	27944	103096	9500	50878	23302	23302	12768	145249
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

6.4.4.2   KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-February											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	93	153	266	45	150	54	54	37	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	271911	185195	165090	22223	107545	44451	44451	19965	52018
Traffic served for all POIs (B)- in erlangs		1	169233	32646	105294	11566	58968	24210	24210	14634	83507
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	93	153	266	45	150	54	54	36	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	263370	185195	171306	20744	109247	44451	44451	19965	51698
Traffic served for all POIs (B)- in erlangs		0	162564	32223	83907	14392	56686	24210	24210	6878	82792
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

6.4.4.3   KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-March											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	93	153	268	45	150	54	54	37	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	261207	185195	166056	13315	104034	44399	44399	19964	84282
Traffic served for all POIs (B)- in erlangs		1	199486	32641	106423	21078	60699	23207	23207	14815	49552
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	93	153	268	45	150	54	54	37	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	261673	185195	166060	12491	104460	44399	44399	19964	84269
Traffic served for all POIs (B)- in erlangs		1	165026	32875	108711	21036	61963	23207	23207	7670	51493
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

6.5   CALL DROP RATE

6.5.1   PARAMETER DESCRIPTION

1. **Definition** - The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released.

    ↳ **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss

    ↳ **Total calls established** = All calls that have TCH allocation during busy hour

2. **Computational Methodology:** (**Total Calls Dropped** / **Total Calls Established) x 100**

3. **TRAI Benchmark** –

    ↳ Call drop rate ≤ 2%

4. **Audit Procedure** –

    ↳ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used

    ↳ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.

6.5.2 KEY FINDINGS - CONSOLIDATED
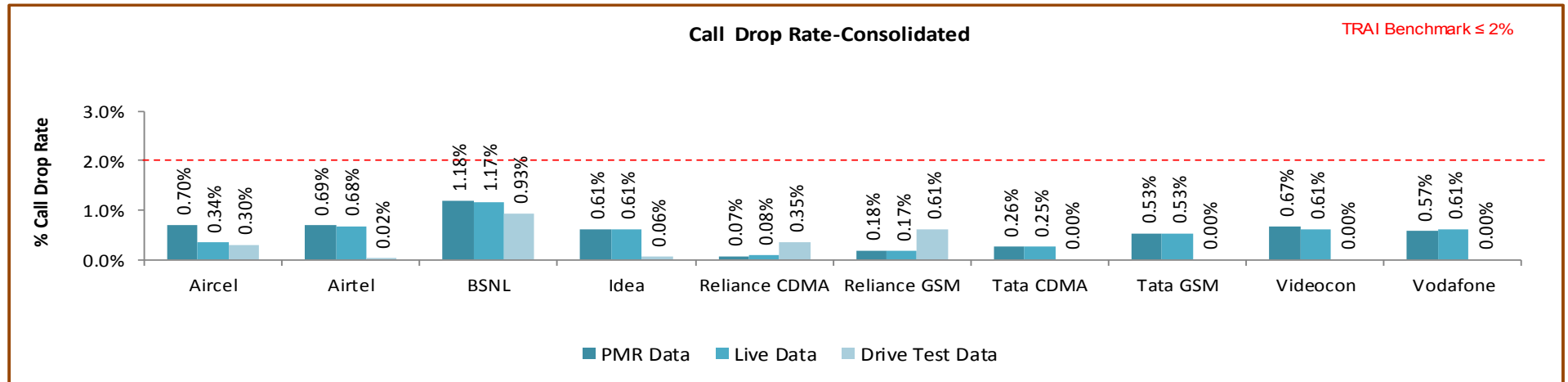
Call Drop Rate-Consolidated

TRAI Benchmark ≤ 2%

	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
PMR Data	0.70%	0.69%	1.18%	0.61%	0.07%	0.18%	0.26%	0.53%	0.67%	0.57%
Live Data	0.34%	0.68%	1.17%	0.61%	0.08%	0.17%	0.25%	0.53%	0.61%	0.61%
Drive Test Data	0.30%	0.02%	0.93%	0.06%	0.35%	0.61%	0.00%	0.00%	0.00%	0.00%

■ PMR Data ■ Live Data ■ Drive Test Data

Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for call drop rate during audit.

6.5.2.1 KEY FINDINGS – MONTH 1

Call Drop Rate-Month 1

TRAI Benchmark ≤ 2%

	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
PMR Data	0.97%	0.74%	1.16%	0.65%	0.07%	0.19%	0.33%	0.55%	0.62%	0.62%
Live Data	0.56%	0.74%	1.01%	0.65%	0.06%	0.20%	0.33%	0.54%	0.59%	0.64%
Drive Test Data	1.40%	0.00%	0.35%	0.00%	0.06%	0.54%	0.00%	0.00%	0.00%	0.00%

■ PMR Data ■ Live Data ■ Drive Test Data

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6.5.2.2   KEY FINDINGS – MONTH 2

Call Drop Rate-Month 2

TRAI Benchmark ≤ 2%

% Call Drop Rate

	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
PMR Data	0.48%	0.67%	1.17%	0.60%	0.08%	0.17%	0.22%	0.52%	0.70%	0.54%
Live Data	0.60%	0.67%	1.15%	0.62%	0.08%	0.15%	0.22%	0.53%	0.58%	0.55%
Drive Test Data	0.00%	0.00%	0.94%	0.06%	0.00%	0.24%	0.00%	0.00%	0.00%	0.00%

■ PMR Data   ■ Live Data   ▢ Drive Test Data

6.5.2.3   KEY FINDINGS – MONTH 3

Call Drop Rate-Month 3

TRAI Benchmark ≤ 2%

% Call Drop Rate

	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
PMR Data	0.62%	0.66%	1.22%	0.58%	0.08%	0.17%	0.31%	0.53%	0.69%	0.56%
Live Data	0.00%	0.65%	1.20%	0.56%	0.09%	0.18%	0.32%	0.50%	0.63%	0.58%
Drive Test Data	0.00%	0.03%	1.27%	0.10%	0.62%	0.79%	0.00%	0.00%	0.00%	0.00%

■ PMR Data   ■ Live Data   ▢ Drive Test Data

Data Source: Network Operations Center (NOC) of the operators

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6.6   CELLS HAVING GREATER THAN 3% TCH DROP

6.6.1   PARAMETER DESCRIPTION

1. **Definition- Worst Affected Cells having more than 3% TCH drop**   shall measure the ratio of total number of cells in the network to the ratio of cells having more than 3% TCH drop.

2. **Computational Methodology:** **(Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the network) x 100**

3. **TRAI Benchmark** – Worst affected cells having more than 3% TCH drop rate ≤ 3%

4. **Audit Procedure** – Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

6.6.2   KEY FINDINGS - CONSOLIDATED
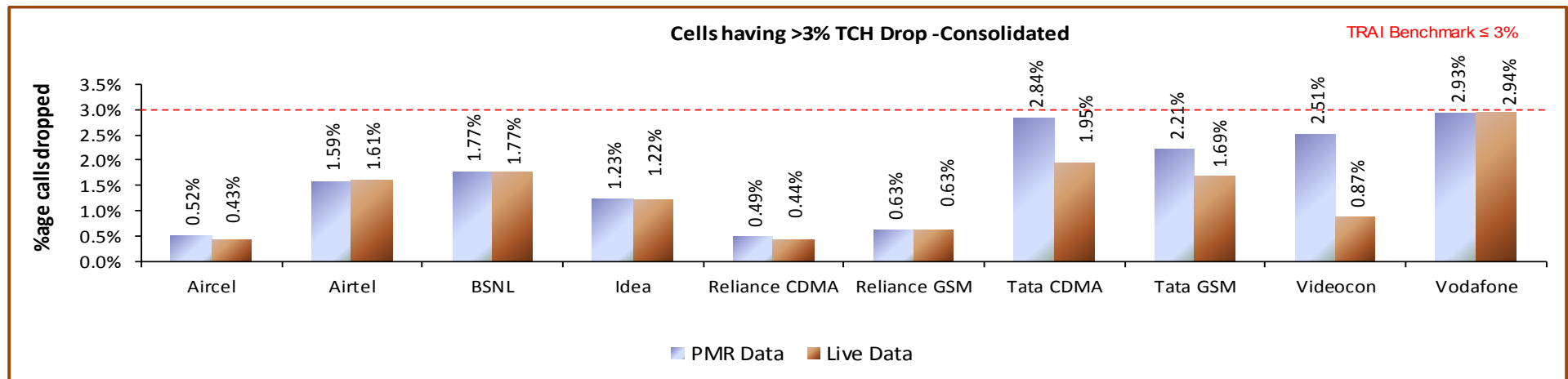
Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for both PMR and Live data.

6.6.2.1   KEY FINDINGS – MONTH 1

Cells having >3% TCH Drop-Month 1

TRAI Benchmark ≤ 3%

Operator	PMR Data	Live Data
Aircel	1.04%	1.04%
Airtel	1.62%	1.66%
BSNL	1.72%	1.61%
Idea	1.29%	1.41%
Reliance CDMA	0.43%	0.39%
Reliance GSM	0.56%	0.45%
Tata CDMA	3.43%	3.20%
Tata GSM	2.27%	1.84%
Videocon	2.43%	2.30%
Vodafone	3.35%	3.51%

%age calls dropped

■ PMR Data   ■ Live Data

6.6.2.2   KEY FINDINGS – MONTH 2

Cells having >3% TCH Drop-Month 2

TRAI Benchmark ≤ 3%

Operator	PMR Data	Live Data
Aircel	0.26%	0.26%
Airtel	1.59%	1.61%
BSNL	1.79%	1.81%
Idea	1.21%	1.22%
Reliance CDMA	0.51%	0.48%
Reliance GSM	0.67%	0.78%
Tata CDMA	2.65%	1.55%
Tata GSM	2.17%	1.62%
Videocon	2.60%	0.15%
Vodafone	2.66%	2.64%

%age calls dropped

■ PMR Data   ■ Live Data

6.6.2.3 KEY FINDINGS – MONTH 3

Cells having >3% TCH Drop-Month 3

TRAI Benchmark ≤ 3%

%age calls dropped

Operator	PMR Data	Live Data
Aircel	0.26%	0.00%
Airtel	1.57%	1.56%
BSNL	1.81%	1.80%
Idea	1.19%	1.04%
Reliance CDMA	0.53%	0.44%
Reliance GSM	0.64%	0.67%
Tata CDMA	2.65%	1.55%
Tata GSM	2.17%	1.62%
Videocon	2.49%	0.17%
Vodafone	2.77%	2.67%

■ PMR Data ■ Live Data

Data Source: Network Operations Center (NOC) of the operators

6.7   VOICE QUALITY

6.7.1   PARAMETER DESCRIPTION

1. **Definition:**

   ↳   for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)

   ↳   For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %

2. **Computational Methodology:**

   ↳   **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**

3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

   a.   A sample of calls would be taken randomly from the total calls established.

   b.   The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

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6.7.2   KEY FINDINGS

Voice Quality-Consolidated

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	98.93%	99.08%	98.97%
Airtel	97.89%	97.88%	97.94%
BSNL	NA	NA	95.73%
Idea	97.84%	97.83%	96.92%
Reliance CDMA	NA	NA	NA
Reliance GSM	98.51%	98.50%	94.75%
Tata CDMA	99.24%	99.22%	NA
Tata GSM	98.91%	98.98%	98.27%
Videocon	98.34%	98.60%	98.57%
Vodafone	98.89%	98.88%	98.62%

■ PMR Data ■ Live Data ■ Drive Test Data
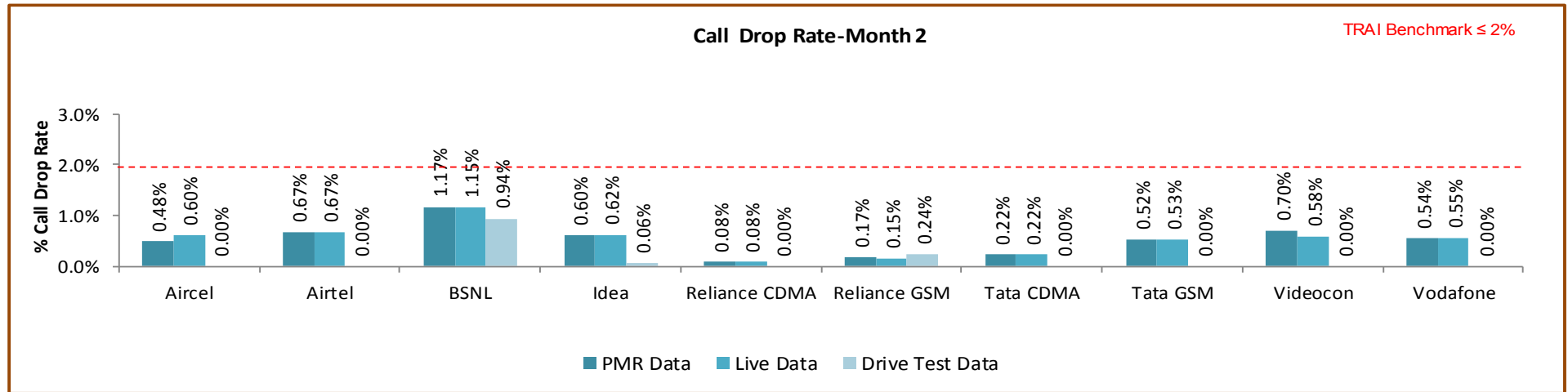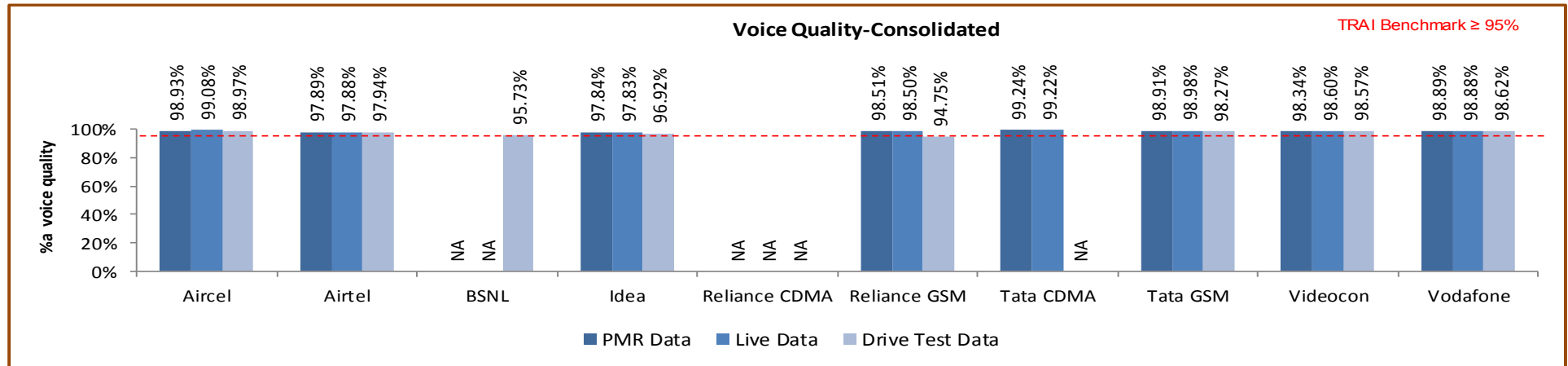
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for the parameter as per audit data.

6.7.2.1   KEY FINDINGS – MONTH 1

Voice Quality-Month 1

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	98.63%	99.20%	99.18%
Airtel	97.80%	97.80%	98.24%
BSNL	NDR	NDR	97.48%
Idea	97.75%	97.77%	97.56%
Reliance CDMA	98.86%	99.02%	98.09%
Reliance GSM	98.51%	98.50%	95.43%
Tata CDMA	99.28%	99.20%	97.89%
Tata GSM	98.94%	99.24%	97.75%
Videocon	98.46%	98.47%	97.70%
Vodafone	98.89%	98.87%	98.29%

■ PMR Data ■ Live Data ■ Drive Test Data

6.7.2.2   KEY FINDINGS – MONTH 2

Voice Quality-Month 2

TRAI Benchmark ≥ 95%

	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
PMR Data	99.25%	97.88%	NDR	97.84%	99.03%	98.51%	99.21%	98.88%	98.28%	98.88%
Live Data	99.85%	97.83%	NDR	97.81%	99.01%	98.56%	99.23%	98.81%	98.65%	98.90%
Drive Test Data	99.19%	98.43%	97.12%	96.68%	98.33%	96.04%	99.66%	98.67%	98.72%	98.62%

■ PMR Data ■ Live Data ■ Drive Test Data

6.7.2.3   KEY FINDINGS – MONTH 3

Voice Quality-Month 3

TRAI Benchmark ≥ 95%

	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
PMR Data	98.97%	98.00%	NDR	97.94%	98.99%	98.50%	99.25%	98.90%	98.30%	98.89%
Live Data	98.62%	98.00%	NDR	97.92%	98.99%	98.45%	99.23%	98.91%	98.56%	98.87%
Drive Test Data	98.79%	97.59%	94.73%	96.81%	98.59%	94.45%	99.54%	98.40%	98.87%	98.75%

■ PMR Data ■ Live Data ■ Drive Test Data

Data Source: Network Operations Center (NOC) of the operators

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7 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 3G

7.1 NODE BS DOWNTIME

7.1.1 PARAMETER DESCRIPTION

- The parameter of network availability would be measured from following sub-parameters

  1. Node Bs downtime (not available for service)

  2. Worst affected Node Bs due to downtime

- **Definition - Node Bs downtime (not available for service):** In the case of 3G networks, instead of BTS the nomenclature is Node B. The measurement methodology for the parameter Node B Accumulated downtime (not available for service) will be similar to the existing parameter for BTSs Accumulated downtime (not available for service).

- **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.
- **Source of Data:** Network Operation Center (NOC) or a Central Server
- **Computation Methodology –**
  Node Bs downtime (not available for service) = **Sum of downtime of Node Bs in a month in hours i.e. total outage time of all Node Bs in hours during a month / (24 x Number of days in a month x Number of Node Bs in the network in licensed service area) x 100**

  3. TRAI Benchmark –

  a. Node Bs downtime (not available for service) ≤ 2%

  4. Audit Procedure –

  - The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

- All the Node Bs in service area was considered. Planned outages due to network up gradation, routine maintenance were not considered.

- Any outage as a result of force majeure were not considered at the time of calculation

- Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

- List of operating sites with cell details and ids are taken from the operator.

    - When there is any outage a performance report gets generated in line with that cell resulting and master base of the Node Bs downtime and worst affected Node Bs due to downtime.

7.1.2   KEY FINDINGS - CONSOLIDATED
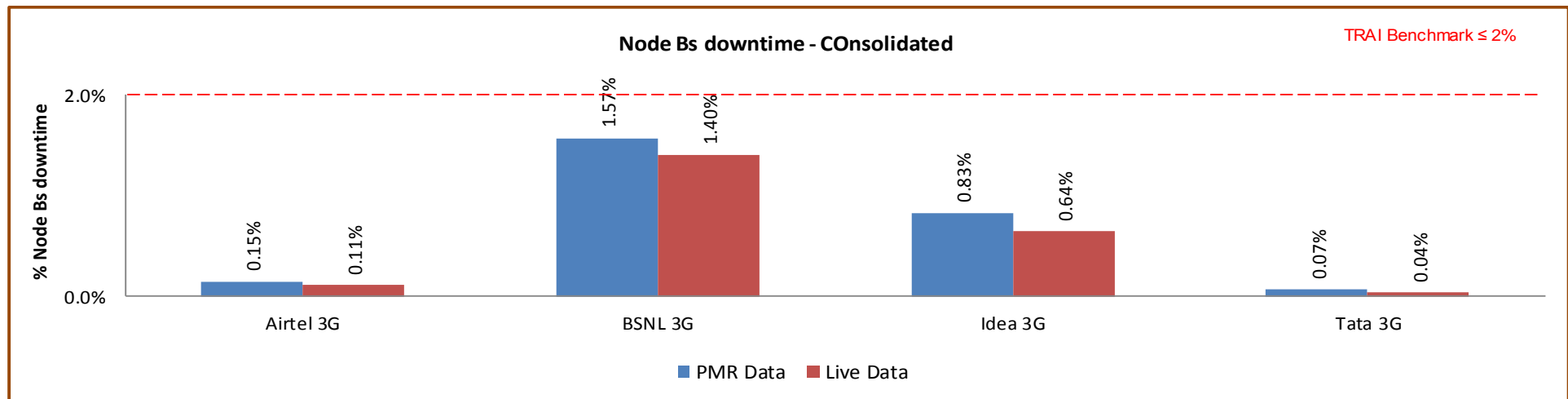
Data Source: Operations and Maintenance Center (OMC) of the operators

BSNL 3G failed to meet the benchmark for the parameter as per PMR and Live data

7.1.2.1   KEY FINDINGS – MONTH 1

Node Bs downtime - Month 1

TRAI Benchmark ≤ 2%

% Node Bs downtime

- Airtel 3G: PMR Data 0.14%, Live Data 0.08%
- BSNL 3G: PMR Data 1.49%, Live Data 0.56%
- Idea 3G: PMR Data 2.41%, Live Data 1.80%
- Tata 3G: PMR Data 0.08%, Live Data 0.02%

■ PMR Data   ■ Live Data

7.1.2.2   KEY FINDINGS – MONTH 2

Node Bs downtime - Month 2

TRAI Benchmark ≤ 2%

% Node Bs downtime

- Airtel 3G: PMR Data 0.13%, Live Data 0.12%
- BSNL 3G: PMR Data 1.58%, Live Data 1.64%
- Idea 3G: PMR Data 0.06%, Live Data 0.12%
- Tata 3G: PMR Data 0.06%, Live Data 0.04%

■ PMR Data   ■ Live Data

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7.1.2.3   KEY FINDINGS – MONTH 3

Node Bs downtime - Month 3

TRAI Benchmark ≤ 2%

	PMR Data	Live Data
Airtel 3G	0.18%	NA
BSNL 3G	1.65%	1.52%
Idea 3G	0.06%	0.04%
Tata 3G	0.06%	0.07%

Data Source: Operations and Maintenance Center (OMC) of the operators

7.2 WORST AFFECTED NODE BS DUE TO DOWNTIME

7.2.1 PARAMETER DESCRIPTION

- **Definition** – **Worst Affected Node Bs due to downtime** shall basically measure percentage of Node Bs having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.
  For measuring the parameter "Percentage of worst affected Node Bs due to downtime" the downtime of each Node B lasting for more than 1 hour at a time in a day during the period of a month was considered.

- **Computation Methodology** – **Worst affected Node Bs due to downtime = (Number of Node Bs having accumulated downtime greater than 24 hours in a month** / **Number of Node Bs in Licensed Service Area) * 100**

- **TRAI Benchmark** –

  b. Worst affected Node Bss due to downtime ≤ 2%

- **Audit Procedure** –

  i. The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

  ii. All the Node Bs in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  iv. Any outage as a result of force majeure was not considered at the time of calculation.

  v. List of operating sites with cell details and ids are taken from the operator.

  vi. All the Node Bs having down time greater than 24 hours is assessed and values of Node Bs accumulated downtime is computed in accordance.

  vii.

7.2.2 KEY FINDINGS – CONSOLIDATED
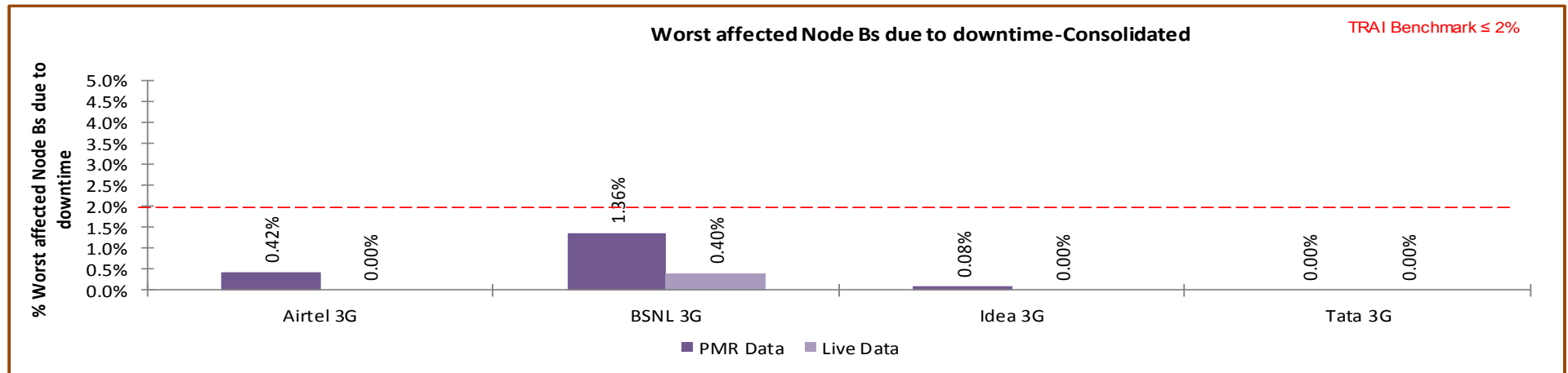
Worst affected Node Bs due to downtime-Consolidated

TRAI Benchmark ≤ 2%

Data Source: Operations and Maintenance Center (OMC) of the operators

All the operators met the benchmark for both PMR and Live data

7.2.2.1 KEY FINDINGS – MONTH 1
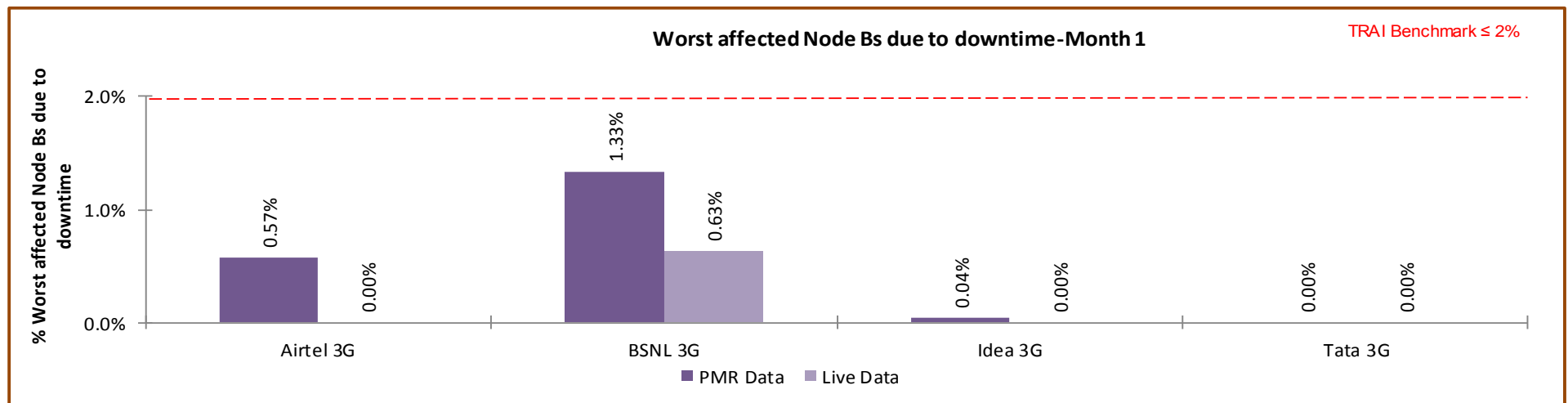
Worst affected Node Bs due to downtime-Month 1

TRAI Benchmark ≤ 2%

7.2.2.2   KEY FINDINGS – MONTH 2

Worst affected Node Bs due to downtime-Month 2

TRAI Benchmark ≤ 2%
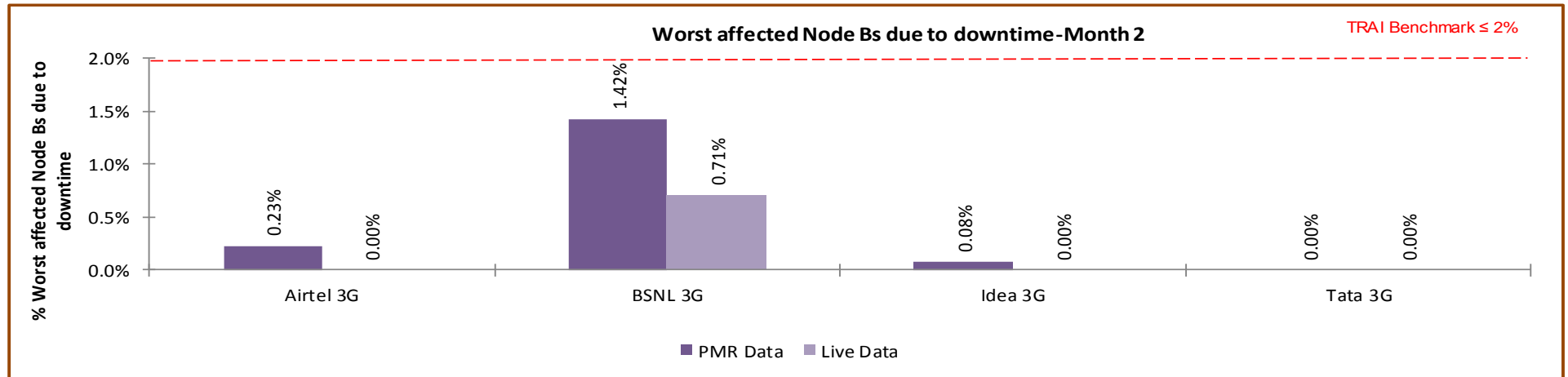
Data Source: Operations and Maintenance Center (OMC) of the operators

7.2.2.3   KEY FINDINGS – MONTH 3

Worst affected Node Bs due to downtime-Month 3

TRAI Benchmark ≤ 2%
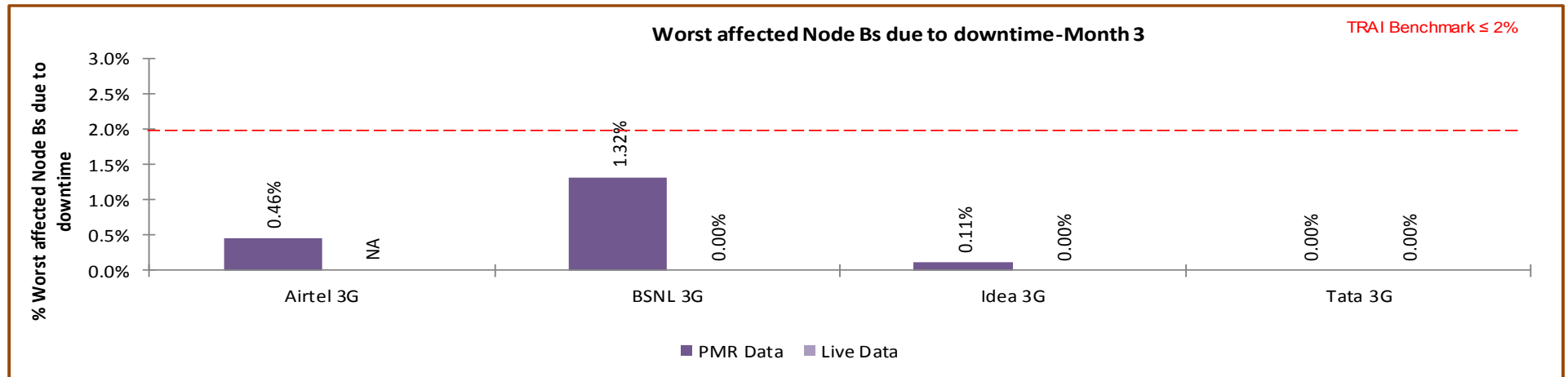
Data Source: Operations and Maintenance Center (OMC) of the operators

7.3   CALL SET UP SUCCESS RATE

7.3.1   PARAMETER DESCRIPTION

1. **Definition:** This parameter is same for 2G Networks as well as 3G Networks. However, the network elements involved in both the networks are different. Call Set-up Success Rate is defined as the ratio of Established Calls to Call Attempts. For establishing a call in 3G Networks, User Equipment (UE) accesses the Universal Terrestrial Radio Access Network (UTRAN) and establishes an RRC connection. Once RRC connection is established the Non Access Stratum (NAS) messages are exchanged between the UE and the Core Network (CN). The last step of the call setup is the establishment of a Radio Access Bearer (RAB) between the CN and the UE. However, any RAB abnormal release after RAB Assignment Response or Alerting/Connect message is to be considered as a dropped call.

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computation Methodology-**
   (RRC Established / Total RRC Attempts) * 100

   RRC Established means the following events have happened in RRC setup:-

   ✎   RRC attempt is made

   ✎   The RRC established

   ✎   The RRC is routed to the outward path of the concerned MSC

5. **TRAI Benchmark ≥** 95%

6. **Audit Procedure –**

   ➲   The cell-wise data generated through counters/ MMC available in the switch for traffic measurements

➲ CSSR calculation should be measured using OMC generated data only

➲ Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week

➲ Counter data is extracted from the NOC of the operators.

➲ Total calls established include all calls established excluding RAB congestion.

☞ The numerator and denominator values are derived from adding the counter values from the MSC.

7.3.2 KEY FINDINGS - CONSOLIDATED
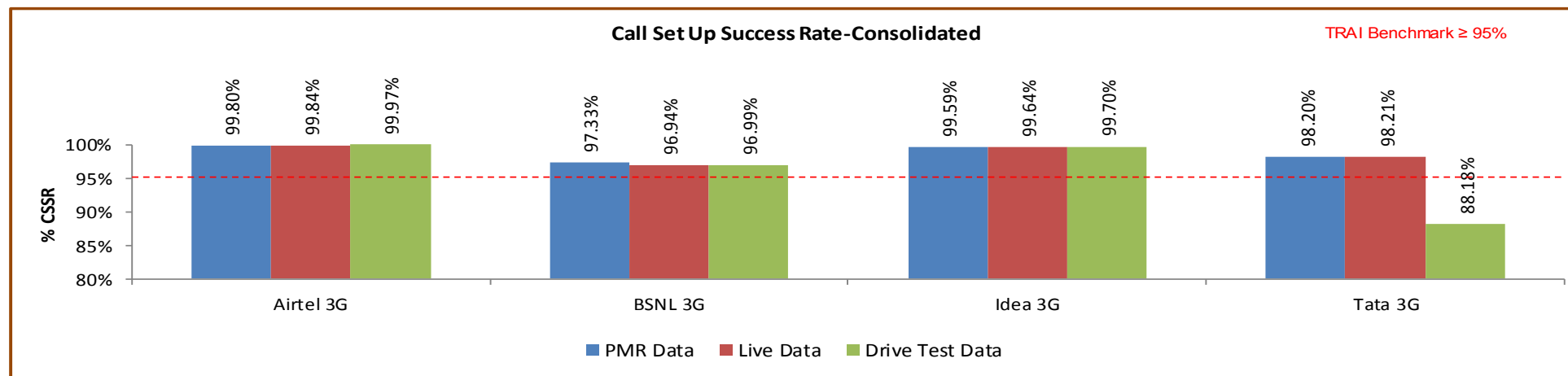
Call Set Up Success Rate-Consolidated

TRAI Benchmark ≥ 95%

	PMR Data	Live Data	Drive Test Data
Airtel 3G	99.80%	99.84%	99.97%
BSNL 3G	97.33%	96.94%	96.99%
Idea 3G	99.59%	99.64%	99.70%
Tata 3G	98.20%	98.21%	88.18%

Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for the parameter as per PMR and Live data. During drive test TATA 3G failed to meet the benchmark.

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7.3.2.1 KEY FINDINGS – MONTH 1

Call Set Up Success Rate-Month 1

TRAI Benchmark ≥ 95%

	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
PMR Data	99.76%	96.61%	99.57%	97.61%
Live Data	99.86%	96.13%	99.63%	97.66%
Drive Test Data	No Coverage	97.79%	99.94%	100.00%

7.3.2.2 KEY FINDINGS – MONTH 2

Call Set Up Success Rate-Month 2

TRAI Benchmark ≥ 95%

	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
PMR Data	99.85%	97.69%	99.57%	98.22%
Live Data	99.86%	97.26%	99.64%	98.12%
Drive Test Data	100.00%	93.69%	99.61%	100.00%

7.3.2.3   KEY FINDINGS – MONTH 3

Call Set Up Success Rate-Month 3

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Airtel 3G	99.80%	99.79%	99.96%
BSNL 3G	97.70%	97.44%	97.32%
Idea 3G	99.64%	99.66%	99.59%
Tata 3G	98.77%	98.84%	80.34%

% CSSR (Y-axis: 0%, 20%, 40%, 60%, 80%, 100%)

■ PMR Data ■ Live Data ■ Drive Test Data

Data Source: Network Operations Center (NOC) of the operators

7.4 NETWORK CHANNEL CONGESTION- RRC CONGESTION/ CIRCUIT SWITCHED RAB CONGESTION

7.4.1 PARAMETER DESCRIPTION

1. **Definition (RRC Congestion):** This parameter has been amended to include RRC Congestion in 3G Networks.
2. **Definition (Circuit Switched RAB congestion):** Circuit Switched RAB congestion is similar to Traffic Channel Congestion. Therefore, the existing parameter has been amended to include RAB congestion in 3G Networks.
3. **Point of Interconnection (POI) Congestion:** This parameter denotes congestion at the outgoing traffic between two networks and is equally applicable for 2G networks and 3G networks.

   - RRC Level: Stand-alone dedicated control channel

   - RAB Level: Traffic Channel

   - POI Level: Point of Interconnect

4. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

5. **Source of Data:** Network Operation Center (NOC) or a Central Server
6. **Computational Methodology:**

   - **RRC / RAB Congestion%** = $[(A_1 \times C_1) + (A_2 \times C_2) + ... + (A_n \times C_n)] / (A_1 + A_2 + ... + A_n)$

     - Where:-A_1 = Number of attempts to establish RRC/ RAB made on day 1

     - C_1 = Average RRC / RAB Congestion % on day 1

     - A_2 = Number of attempts to establish RRC / RAB made on day 2

     - C_2 = Average RRC / RAB Congestion % on day 2

     - A_n = Number of attempts to establish RRC / RAB made on day n

     - C_n = Average RRC / RAB Congestion % on day n

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- **POI Congestion%** = **[(A1 x C1) + (A2 x C2) +.......+ (An x Cn)] / (A1 + A2 +...+ An)**

  - Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1

  - C1 = Average POI Congestion % on day 1

  - A2 = POI traffic offered on all POIs (no. of calls) on day 2

  - C2 = Average POI Congestion % on day 2

  - An = POI traffic offered on all POIs (no. of calls) on day n

  - Cn = Average POI Congestion % on day n

7. **Benchmark:**

   - RRC Congestion: ≤ 1%, RAB Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

8. **Audit Procedure –**

   - Audit of the details of RRC and RAB congestion percentages computed by the operator (using OMC–Switch data only) would be conducted

     - The operator should be measuring this parameter during Time consistent busy hour (TCBH) only RRC

7.4.2   KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)
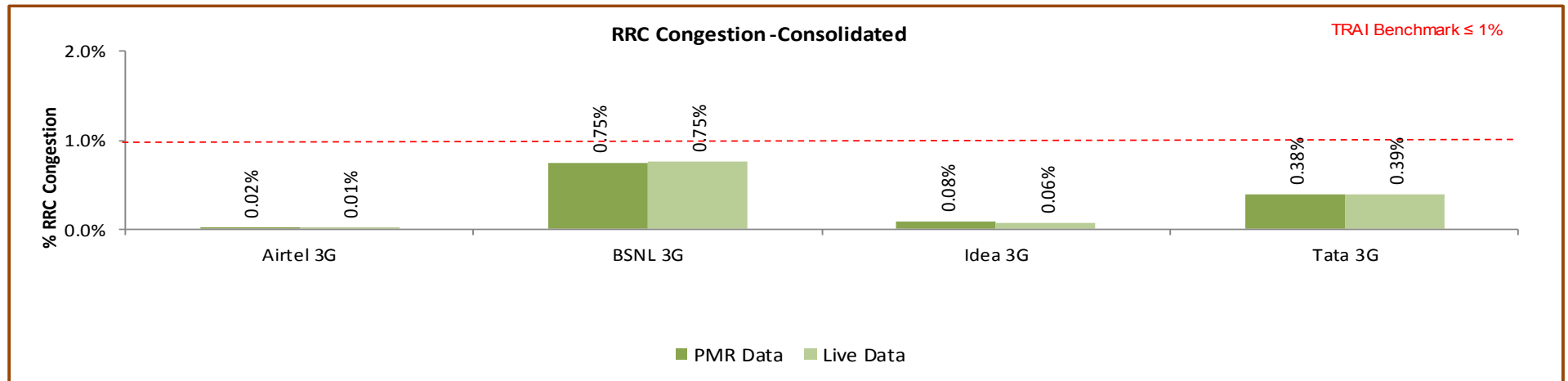
RRC Congestion - Consolidated

TRAI Benchmark ≤ 1%

- Airtel 3G: PMR Data 0.02%, Live Data 0.01%
- BSNL 3G: PMR Data 0.75%, Live Data 0.75%
- Idea 3G: PMR Data 0.08%, Live Data 0.06%
- Tata 3G: PMR Data 0.38%, Live Data 0.39%

■ PMR Data ■ Live Data
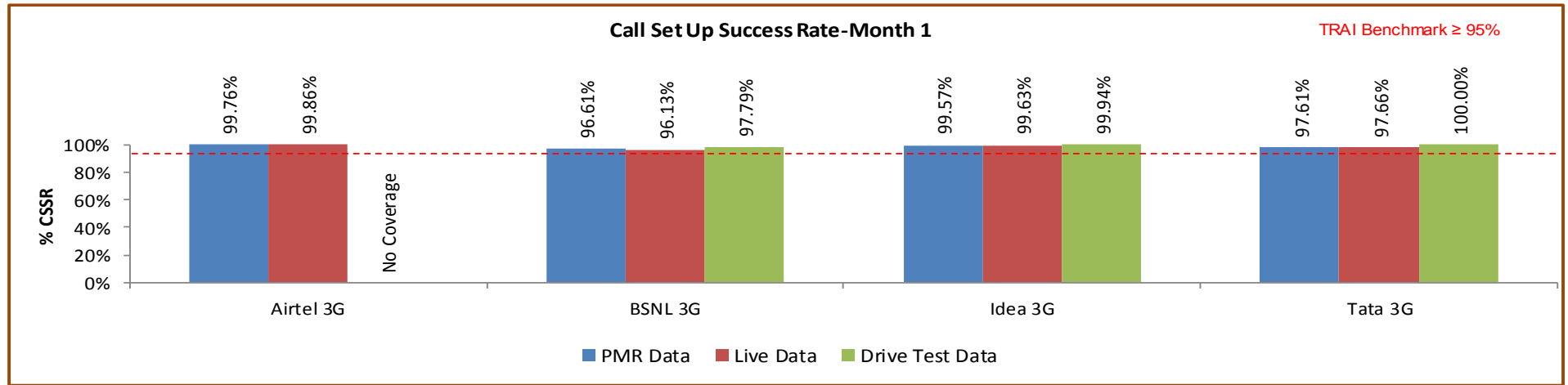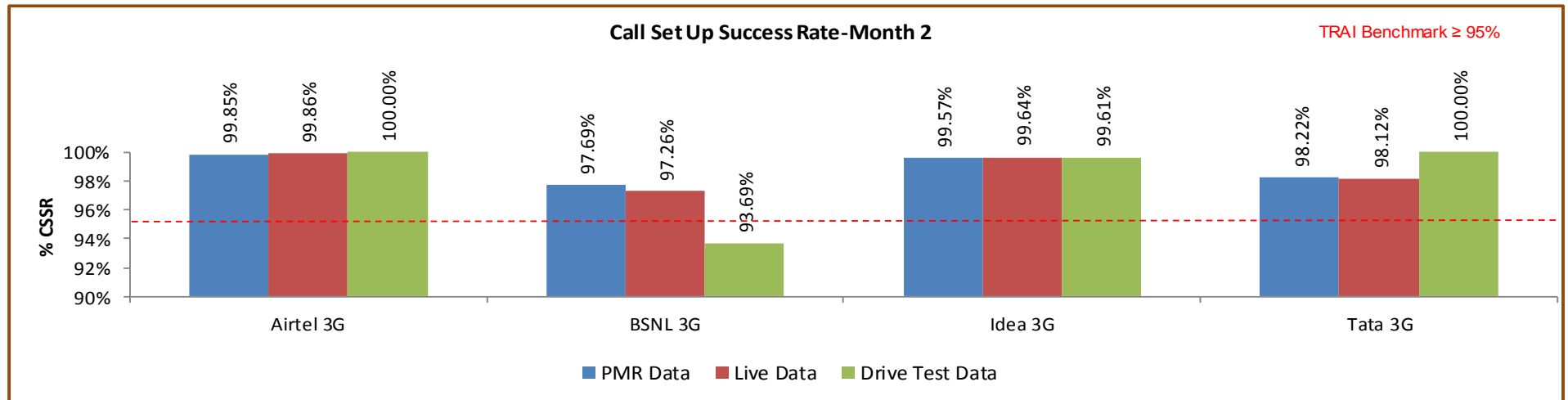
Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for the parameter as per PMR and Live data.

7.4.2.1   KEY FINDINGS – MONTH 1

RRC Congestion - Month 1

TRAI Benchmark ≤ 1%

- Airtel 3G: PMR Data 0.03%, Live Data 0.01%
- BSNL 3G: PMR Data 0.92%, Live Data 0.88%
- Idea 3G: PMR Data 0.11%, Live Data 0.09%
- Tata 3G: PMR Data 0.59%, Live Data 0.66%

■ PMR Data ■ Live Data

7.4.2.2   KEY FINDINGS – MONTH 2

RRC Congestion - Month 2

TRAI Benchmark ≤ 1%

Operator	PMR Data	Live Data
Airtel 3G	0.01%	0.02%
BSNL 3G	0.64%	0.65%
Idea 3G	0.09%	0.08%
Tata 3G	0.28%	0.26%

■ PMR Data   ■ Live Data

7.4.2.3   KEY FINDINGS – MONTH 3

RRC Congestion - Month 3

TRAI Benchmark ≤ 1%

Operator	PMR Data	Live Data
Airtel 3G	0.01%	0.01%
BSNL 3G	0.68%	0.73%
Idea 3G	0.05%	0.02%
Tata 3G	0.28%	0.25%

■ PMR Data   ■ Live Data

Data Source: Network Operations Center (NOC) of the operators

7.4.3   KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)
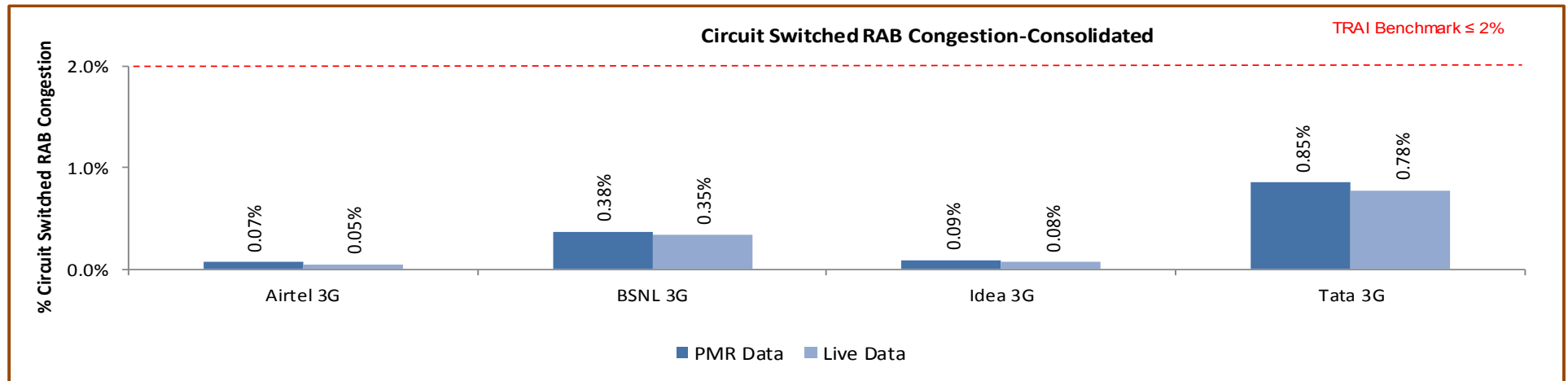
Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for the parameter as per PMR and Live data.

7.4.3.1   KEY FINDINGS – MONTH 1

7.4.3.2 KEY FINDINGS – MONTH 2

Circuit Switched RAB Congestion-Month 2

TRAI Benchmark ≤ 2%

% Circuit Switched RAB Congestion

	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
PMR Data	0.04%	0.18%	0.09%	0.93%
Live Data	0.07%	0.24%	0.09%	0.80%

■ PMR Data ■ Live Data

7.4.3.3 KEY FINDINGS – MONTH 3

Circuit Switched RAB Congestion-Month 3

TRAI Benchmark ≤ 2%

% Circuit Switched RAB Congestion

	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
PMR Data	0.05%	0.22%	0.08%	0.47%
Live Data	0.04%	0.17%	0.03%	0.44%

■ PMR Data ■ Live Data

Data Source: Network Operations Center (NOC) of the operators

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7.4.4 KEY FINDINGS – POI CONGESTION (CONSOLIDATED) – AVERAGE OF 3 MONTHS

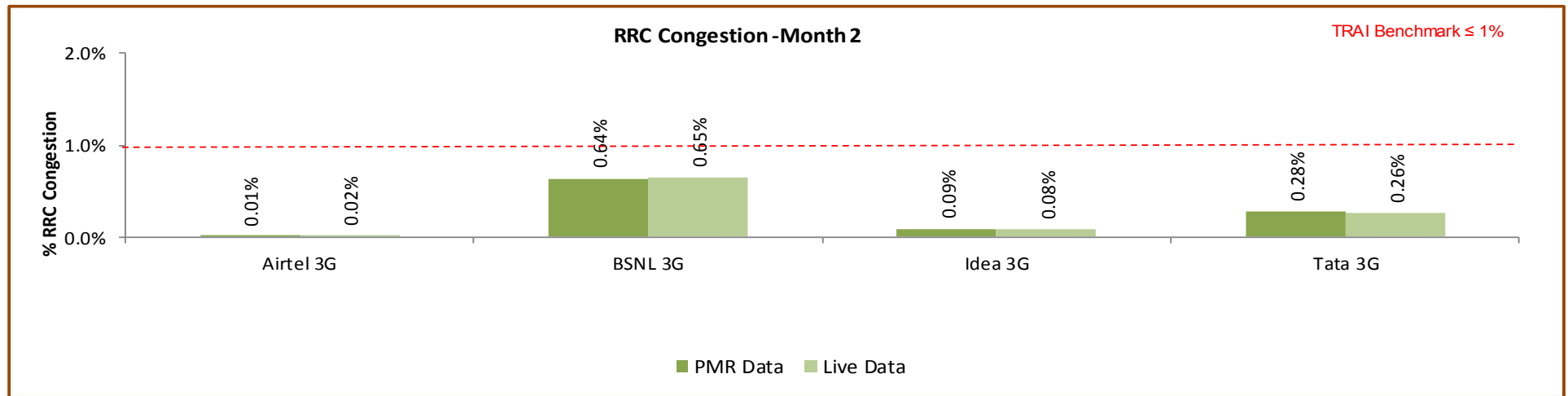| Audit Results for POI Congestion- PMR data					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total number of working POIs		279	459	810	162
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		796863	555395	768190	132531
Traffic served for all POIs (B)- in erlangs		524743	96617	314706	71722
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total number of working POIs		279	367	810	162
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		788792	433676	502305	132531
Traffic served for all POIs (B)- in erlangs		491259	93694	293426	71722
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark of POI Congestion as per PMR/audit Data.

7.4.4.1   KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-January					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total number of working POIs		93	153	276	54
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		263746	185005	437044	43629
Traffic served for all POIs (B)- in erlangs		156024	31351	102989	23302
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total number of working POIs		93	61	276	54
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		263749	63286	164943	43629
Traffic served for all POIs (B)- in erlangs		163670	27944	103096	23302
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

7.4.4.2   KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-February					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total number of working POIs		93	153	266	54
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		271911	185195	165090	44451
Traffic served for all POIs (B)- in erlangs		169233	32646	105294	24210
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total number of working POIs		93	153	266	54
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		263370	185195	171306	44451
Traffic served for all POIs (B)- in erlangs		162564	32875	83907	24210
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

7.4.4.3   KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-March					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total number of working POIs		93	153	268	54
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		261207	185195	166056	44451
Traffic served for all POIs (B)- in erlangs		199486	32621	106423	24210
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total number of working POIs		93	153	268	54
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		261673	185195	166056	44451
Traffic served for all POIs (B)- in erlangs		165026	32875	106423	24210
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

7.5 CIRCUIT SWITCHED VOICE DROP RATE

7.5.1 PARAMETER DESCRIPTION

1. **Definition** - The Call Drop Rate measures the inability of Network to maintain a call and is defined as the ratio of abnormal speech disconnects with respect to all speech disconnects (both normal and abnormal). In 3G Networks, a normal disconnect is initiated from the Mobile Switching Centre (MSC) at completion of the call by a RAB Disconnect message. An abnormal RAB disconnect can be initiated by either UTRAN or CN and includes Radio Link Failures, Uplink (UL) or Downlink (DL) interference or any other reason.

   ⤷ **Total No. of voice RAB abnormally released** = All calls ceasing unnaturally i.e. due to handover or due to radio loss

   ⤷ **No. of voice RAB normally released** = All calls that have RAB allocation during busy hour

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computational Methodology:** (No. of voice RAB normally released / (No. of voice RAB normally released + RAB abnormally released)x 100

Key Performance Indicator Term	Definition
#RAB Normal Release(CSV)	Number of voice RAB normally Released
#RAB Abnormal Release(CSV)	Number of voice RAB abnormally Released

5. **TRAI Benchmark** –

   ⤷ Circuit switched voice drop rate ≤ 2%

6. **Audit Procedure** –

   ➲ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used

   ⤷ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.

7.5.2   KEY FINDINGS - CONSOLIDATED
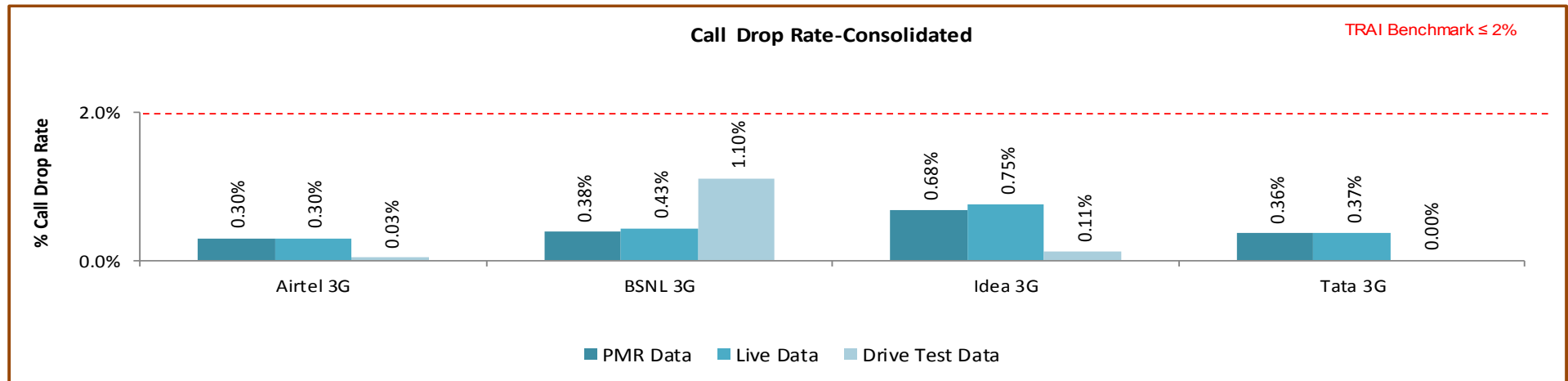
Call Drop Rate-Consolidated

TRAI Benchmark ≤ 2%

Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for call drop rate during audit.

7.5.2.1   KEY FINDINGS – MONTH 1

Call Drop Rate-Month 1

TRAI Benchmark ≤ 2%

7.5.2.2   KEY FINDINGS – MONTH 2

Call Drop Rate-Month 2

TRAI Benchmark ≤ 2%

% Call Drop Rate

	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
PMR Data	0.30%	0.38%	0.72%	0.37%
Live Data	0.31%	0.38%	0.68%	0.38%
Drive Test Data	0.00%	0.00%	0.00%	0.00%

■ PMR Data   ■ Live Data   ■ Drive Test Data

7.5.2.3   KEY FINDINGS – MONTH 3

Call Drop Rate-Month 3

TRAI Benchmark ≤ 2%

% Call Drop Rate

	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
PMR Data	NA	0.37%	0.60%	0.33%
Live Data	NA	0.37%	0.75%	0.34%
Drive Test Data	0.04%	1.72%	0.22%	0.00%

■ PMR Data   ■ Live Data   ■ Drive Test Data

Data Source: Network Operations Center (NOC) of the operators

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7.6 WORST AFFECTED CELLS HAVING MORE THAN 3% CIRCUIT SWITCHED VOICE DROP RATE

7.6.1 PARAMETER DESCRIPTION

1. **Definition- Cells having more than 3% circuit switch voice quality:** The existing parameter has been amended to cover 3G Networks to assess worst affected cells having more than 3% CSV Drop Rate.

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computational Methodology:** **(Number of cells having CSV drop rate > 3% during CBBH in a month** / **Total number of cells in the licensed area) x 100**

5. **TRAI Benchmark** –

   ↳ Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

6. **Audit Procedure** –

   ➲ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

7.6.2   KEY FINDINGS - CONSOLIDATED
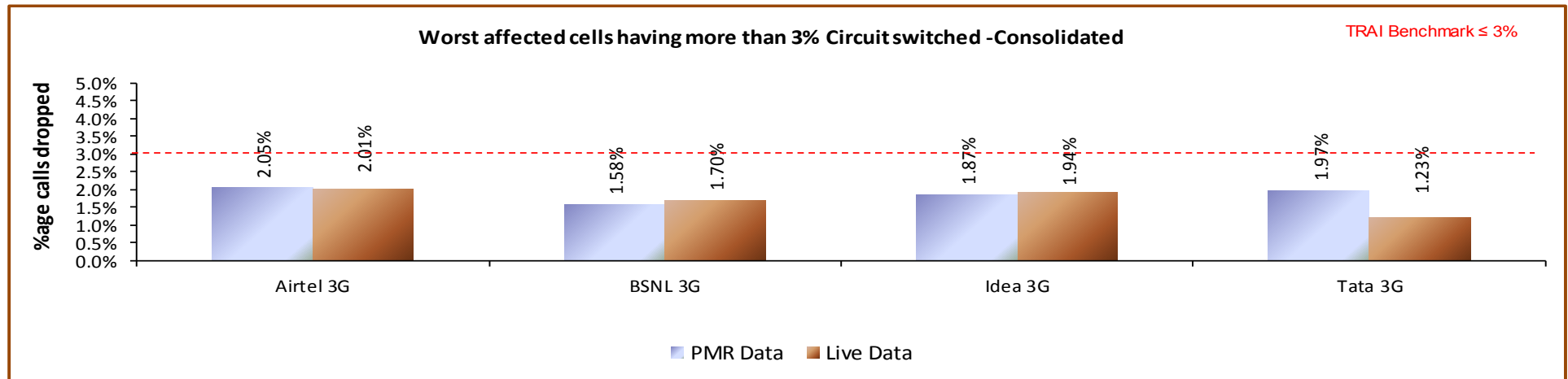
Worst affected cells having more than 3% Circuit switched -Consolidated

TRAI Benchmark ≤ 3%

Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark during audit for live calling.

7.6.2.1   KEY FINDINGS – MONTH 1

Worst affected cells having more than 3% Circuit switched -Month 1

TRAI Benchmark ≤ 3%

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7.6.2.2 KEY FINDINGS – MONTH 2

Worst affected cells having more than 3% Circuit switched -Month 2

TRAI Benchmark ≤ 3%

Chart: %age calls dropped

- Airtel 3G: PMR Data 2.07%, Live Data 1.88%
- BSNL 3G: PMR Data 1.53%, Live Data 1.52%
- Idea 3G: PMR Data 2.04%, Live Data 1.81%
- Tata 3G: PMR Data 1.95%, Live Data 1.03%

PMR Data ■ Live Data ■

7.6.2.3 KEY FINDINGS – MONTH 3

Worst affected cells having more than 3% Circuit switched -Month 3

TRAI Benchmark ≤ 3%

Chart: %age calls dropped

- Airtel 3G: PMR Data NA, Live Data NA
- BSNL 3G: PMR Data 1.63%, Live Data 1.62%
- Idea 3G: PMR Data 1.64%, Live Data 2.06%
- Tata 3G: PMR Data 1.85%, Live Data 0.88%

PMR Data ■ Live Data ■

Data Source: Network Operations Center (NOC) of the operators

7.7   CIRCUIT SWITCH VOICE QUALITY

7.7.1   PARAMETER DESCRIPTION

5. **Definition:**

   ✎   for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)

   ✎   For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %

6. **Computational Methodology:**

   ✎   **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**

7. **TRAI Benchmark:** ≥ 95%

8. **Audit Procedure** –

   a.   A sample of calls would be taken randomly from the total calls established.

   b.   The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

7.7.2   KEY FINDINGS
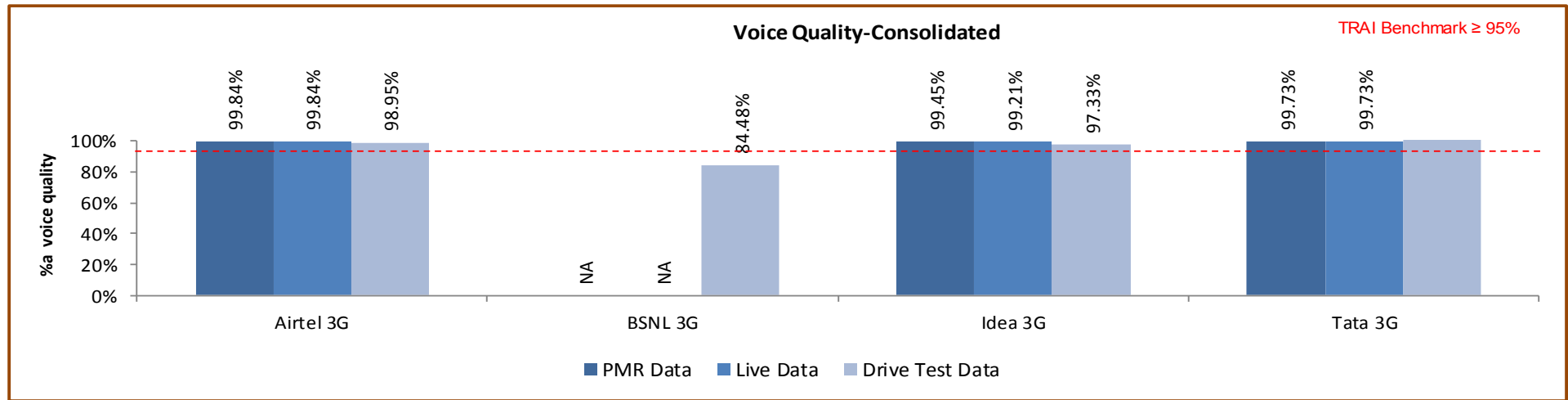
Voice Quality-Consolidated

TRAI Benchmark ≥ 95%

Airtel 3G: PMR Data 99.84%, Live Data 99.84%, Drive Test Data 98.95%	BSNL 3G: PMR Data NA, Live Data NA, Drive Test Data 84.48%	Idea 3G: PMR Data 99.45%, Live Data 99.21%, Drive Test Data 97.33%

■ PMR Data   ■ Live Data   ■ Drive Test Data

Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for the parameter as per PMR and Live data. Data for BSNL was not available due to technical issues.

7.7.2.1   KEY FINDINGS – MONTH 1

Voice Quality-Month 1

TRAI Benchmark ≥ 95%

Airtel 3G: PMR Data 99.94%, Live Data 99.95%, Drive Test Data No Coverage
BSNL 3G: PMR Data NDR, Live Data NDR, Drive Test Data 76.46%
Idea 3G: PMR Data 100.00%, Live Data 99.24%, Drive Test Data 97.15%
Tata 3G: PMR Data 99.72%, Live Data 99.71%

■ PMR Data   ■ Live Data   ■ Drive Test Data

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7.7.2.2   KEY FINDINGS – MONTH 2

Voice Quality-Month 2

TRAI Benchmark ≥ 95%

	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
PMR Data	99.90%	NDR	99.19%	99.73%
Live Data	99.94%	NDR	99.19%	99.73%
Drive Test Data	99.72%	83.23%	97.50%	99.44%

%a voice quality (y-axis: 0%–100%)

7.7.2.3   KEY FINDINGS – MONTH 3

Voice Quality-Month 3

TRAI Benchmark ≥ 95%

	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
PMR Data	99.71%	NDR	99.19%	99.74%
Live Data	99.71%	NDR	99.20%	99.74%
Drive Test Data	98.77%	98.02%	97.32%	99.03%

%a voice quality (y-axis: 0%–100%)

■ PMR Data   ■ Live Data   ■ Drive Test Data

Data Source: Network Operations Center (NOC) of the operators

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8   PARAMETER DESCRIPTION & DETAILED FINDINGS - WIRELESS DATA SERVICES (2G & 3G)

8.1   SERVICE ACTIVATION /PROVISIONING FOR 2G & 3G

8.1.1   PARAMETER DESCRIPTION

This refers to the activation of services after activation of the SIM. This involves programming the various databases with the customer's information and any gateways to standard Internet chat or mail services or any data services. The service provider typically sends these settings to the subscriber's handset using SMS or WAP.

$$\textbf{\% activation done within 4 hours} = \frac{\text{Total Time Taken for Activation}}{\text{Total request time made}} \times 100$$

8.2   PDP CONTEXT ACTIVATION SUCCESS RATE FOR 2G & 3G

8.2.1   PARAMETER DESCRIPTION

A Packet Data Protocol (PDP) context specifies access to an external packet-switching network. The data associated with the PDP context contains information such as the type of packet-switching network, the Mobile Station PDP (MS PDP) address that is the IP address, the reference of Gateway GPRS Support Node (GGSN), and the requested QoS. A PDP context is handled by the MS, Serving GPRS Support Node (SGSN) and GGSN and is identified by a mobile's PDP address within these entities. Several PDP contexts can be activated at the same time within a given MS.

Measurement

This measurement provides the number of successfully completed PDP context activations. For these context activations, the GGSN is updated successfully and a report of PDP context activation success is generated at GGSN.

PDP Context Activation Success Rate (%) =

$$\frac{\text{Number of successfully completed PDP context activations}}{\text{Total attempts of context activation}} \times 100$$

8.3 DROP RATE FOR 2G & 3G

8.3.1.1 PARAMETER DESCRIPTION

It measures the inability of Network to maintain a connection and is defined as the ratio of abnormal disconnects w.r.t. all disconnects (both normal and abnormal). An abnormal disconnect may happen because of Radio Link Failures, Uplink (UL) or Downlink (DL) interference, bad coverage, unsuccessful handovers or any other reason. The drop rate is to be measured for all generations of the technologies separately.

$$\textbf{Drop rate } = \frac{\text{No. of Dropped data Calls}}{\text{No. of Successful data calls}} \times 100$$

8.3.2 KEY FINDINGS – 2G

Wireless Data-PMR											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Activation done within 4 hours											
Total request time made		120	0	0	845169	56042	0	24	78	0	0
Total Time Taken for Activation		104	0	0	845243	56036	0	23	78	0	0
% activation done within 4 hours	≥ 95%	86.67%	NDR	NDR	100.01%	99.99%	NDR	95.83%	100.00%	NDR	NDR
PDP Context activation success rate											
No. of data Session requested		3723027654	1673747171	0	128432308	0	12755089	0	8830371	0	0
No. of data Session Successful		3552573553	1652157852	0	125928523	0	12732622	0	8811282	0	0
PDP Context activation success rate	≥ 95%	95.42%	98.71%	NDR	98.05%	NDR	99.82%	NDR	99.78%	NDR	NDR
Drop Rate											
No. of Successful data calls		226505	11860942213	0	17700567283	0	3853585065	0	3290000000	0	0
No. of Dropped data Calls		11029	424506390	0	171848749	0	163760050	0	61293620	0	0
Drop rate	≤ 5%	4.87%	3.58%	NDR	0.97%	NDR	4.25%	NDR	1.86%	NDR	NDR
Wireless Data-Live Data											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Activation done within 4 hours											
Total request time made		0	0	0	27419	0	0	0	0	0	0
Total Time Taken for Activation		0	0	0	27419	0	0	0	0	0	0
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	100.00%	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate											
No. of data Session requested		114946802	0	355437	6923894	0	0	0	0	0	0
No. of data Session Successful		114562035	0	338612	6849725	0	0	0	0	0	0
PDP Context activation success rate	≥ 95%	99.67%	NDR	95.27%	98.93%	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate											
No. of Successful data calls		12000	0	0	839893640	0	0	0	0	0	0
No. of Dropped data Calls		436	0	0	7385433	0	0	0	0	0	0
Drop rate	≤ 5%	3.63%	NDR	NDR	0.88%	NDR	NDR	NDR	NDR	NDR	NDR

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8.3.3   KEY FINDINGS – 3G

Wireless Data-PMR					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Activation done within 4 hours					
Total request time made		0	0	0	0
Total Time Taken for Activation		0	0	0	0
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR
PDP Context activation success rate					
No. of data Session requested		170467804	0	44473534	16872195
No. of data Session Successful		169568262	0	43925003	16868144
PDP Context activation success rate	≥ 95%	99.47%	NDR	98.77%	99.98%
Drop Rate					
No. of Successful data calls		15245526124	0	18289719250	295000000
No. of Dropped data Calls		9756136	0	137078850	5755752
Drop rate	≤ 5%	0.06%	NDR	0.75%	1.95%
Wireless Data-Live Data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Activation done within 4 hours					
Total request time made		0	0	0	0
Total Time Taken for Activation		0	0	0	0
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR
PDP Context activation success rate					
No. of data Session requested		0	1084569	1567689	0
No. of data Session Successful		0	1040569	1549828	0
PDP Context activation success rate	≥ 95%	NDR	95.94%	98.86%	NDR
Drop Rate					
No. of Successful data calls		0	32937157	1578761382	0
No. of Dropped data Calls		0	993549	11921084	0
Drop rate	≤ 5%	NDR	3.02%	0.76%	NDR

9   PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

9.1   METERING AND BILLING CREDIBILITY

The billing complaints for postpaid are calculated by averaging over one billing cycle in a quarter. For example, there are three billing cycles in a quarter, the data for each billing cycle is calculated separately and then averaged over.

The charging complaints for prepaid are calculated by taking all complaints in a quarter.

9.1.1   PARAMETER DESCRIPTION

All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th December, 2009 were covered. The types of billing complaints covered are listed below.

- ✋ Payments made and not credited to the subscriber account

- ✋ Payment made on time but late payment charge levied wrongly

- ✋ Wrong roaming charges

- ✋ Double charges

- ✋ Charging for toll free services

- ✋ Local calls charged/billed as STD/ISD or vice versa

- ✋ Calls or messages made disputed

- ✋ Validity related complaints

- ✋ Credit agreed to be given in resolution of complaint, but not accounted in the bill

- ✋ Charging for services provided without consent

- ✋ Charging not as per tariff plans or top up vouchers/ special packs etc.

- ✋ Overcharging or undercharging

In addition to the above, any billing complaint which leads to billing error, waiver, refund, credit, or any adjustment is also considered as valid billing complaint for calculating the number of disputed bills.

➲ Computational Methodology:

↳ **Billing complaints per 100 bills issued (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100

↳ *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated

↳ **Billing complaints here shall include only dispute related issues (including those that February arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.

↳ **Charging complaints per 100 subscribers (Prepaid)** = (Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter) * 100

➲ TRAI Benchmark: <= 0.1%

➲ Audit Procedure:

↳ Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted

➲ For Postpaid, the total billing complaints would be audited by averaging over billing cycles in a quarter

➲ For Prepaid, the data of total charging complaints in a quarter would be taken for the purpose of audit

9.1.2   KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)

Metering and billing credibility - Postpaid

TRAI Benchmark ≤ 0.1%

Percentage bills disputed

Operator	Value
Aircel	0.00%
Airtel	0.17%
BSNL	0.02%
Idea	0.49%
Reliance CDMA	0.09%
Reliance GSM	0.09%
Tata CDMA	0.00%
Tata GSM	0.00%
Videocon	NA
Vodafone	0.24%

■ Audit Results for Billing performance Postpaid-Consolidated
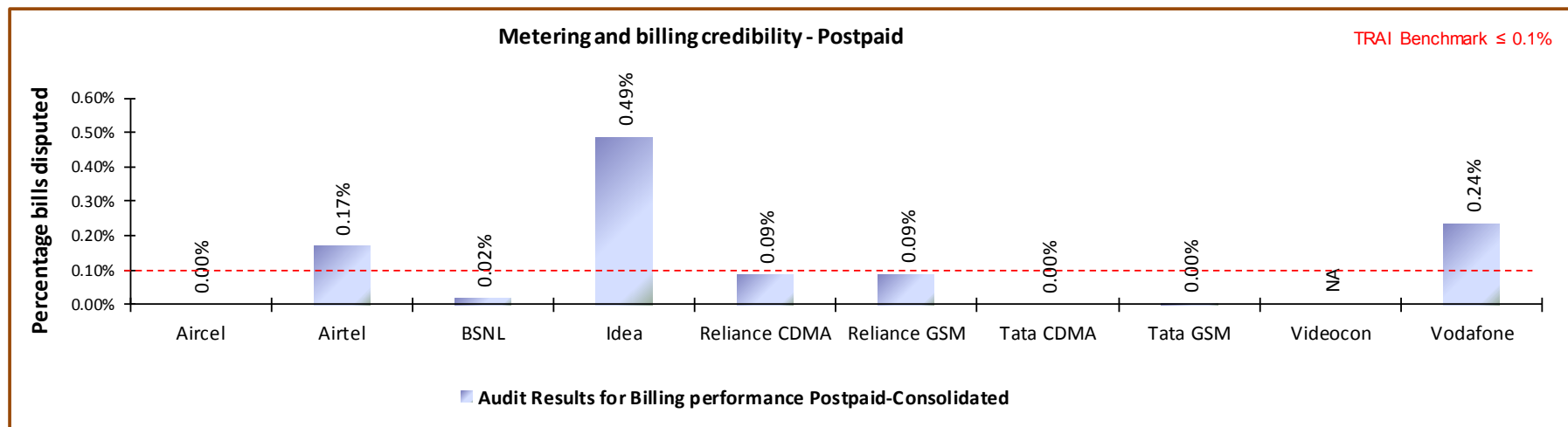
Data Source: Billing Center of the operators

Airtel, Idea and Vodafone failed to meet the benchmark of 0.1% postpaid metering and billing credibility.

Metering and billing credibility - Postpaid (Billing cycle wise)

TRAI Benchmark ≤ 0.1%

Percentage bills disputed

Operator	January	February	March
Aircel	0.00%	0.00%	0.00%
Airtel	0.18%	0.19%	0.14%
BSNL	0.03%	0.02%	0.01%
Idea	0.44%	0.51%	0.51%
Reliance CDMA	0.09%	0.09%	0.09%
Reliance GSM	0.09%	0.09%	0.09%
Tata CDMA	0.00%	0.00%	0.00%
Tata GSM	0.00%	0.00%	0.01%
Videocon	NA	NA	NA
Vodafone	0.23%	0.22%	0.26%

■ January ■ February ■ March

Data Source: Billing Center of the operators

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9.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)
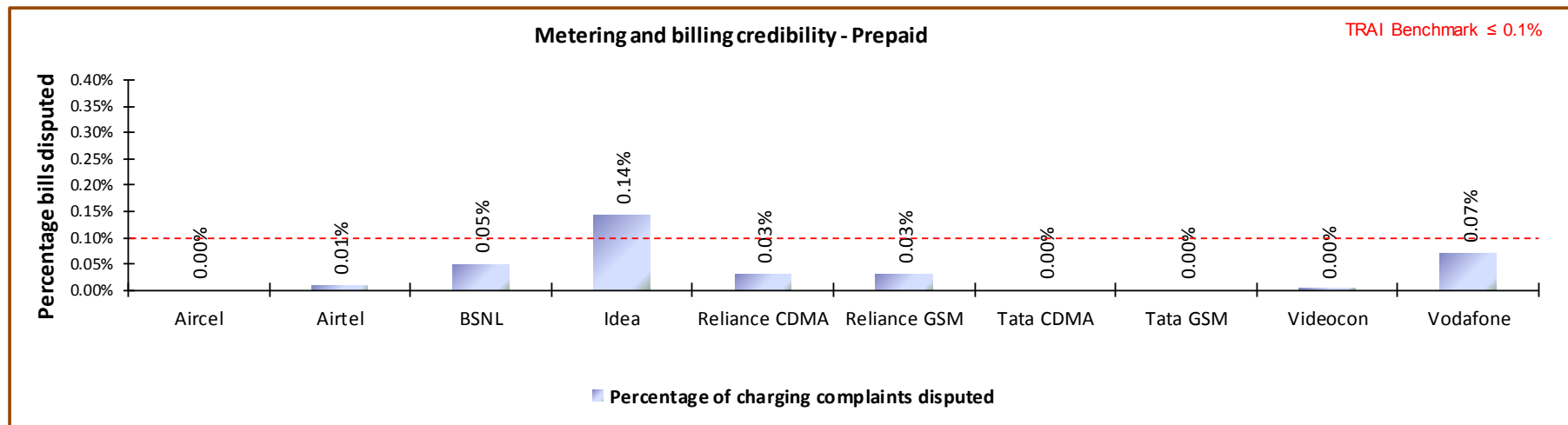
Data Source: Billing Center of the operators

Idea failed to meet the benchmark for metering and billing credibility of prepaid subscribers.

9.2   RESOLUTION OF BILLING/ CHARGING COMPLAINTS

9.2.1   PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed to -calculate resolution of billing complaints.

Resolution of billing complaints within 4 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 4 weeks =

$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 4 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

Resolution of billing complaints within 6 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

✎   **Billing complaints here shall include only dispute related issues (including those that February arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally. Complaints raised by the consumers to operator are only considered as part of the calculation.

⮏ The complaints that get marked as invalid by the operator are not considered for calculation as those complaints cannot be considered as resolved by the operator.

➲ *** Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.

Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

9.2.2 KEY FINDINGS - WITHIN 4 WEEKS
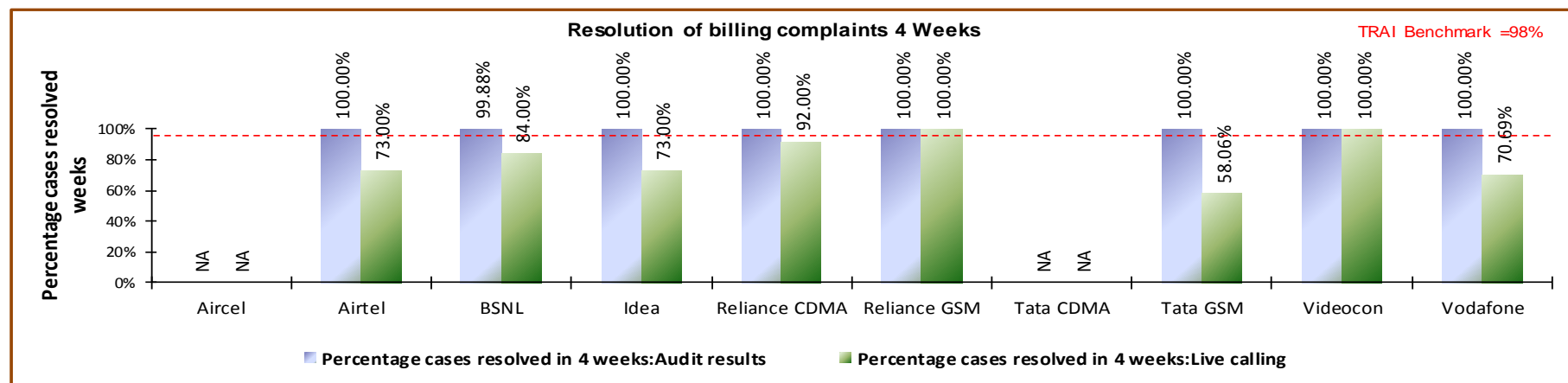
Resolution of billing complaints 4 Weeks
TRAI Benchmark =98%

Operator	Audit results	Live calling
Aircel	NA	NA
Airtel	100.00%	73.00%
BSNL	99.88%	84.00%
Idea	100.00%	73.00%
Reliance CDMA	100.00%	92.00%
Reliance GSM	100.00%	100.00%
Tata CDMA	NA	NA
Tata GSM	100.00%	58.06%
Videocon	100.00%	100.00%
Vodafone	100.00%	70.69%

■ Percentage cases resolved in 4 weeks:Audit results   ■ Percentage cases resolved in 4 weeks:Live calling

As per the consumers (live calling exercise) only Reliance GSM and Videocon were able to meet the benchmark of resolving 98% complaints within 4 weeks.

9.2.3 KEY FINDINGS WITHIN 6 WEEKS

Resolution of billing complaints 6 Weeks

TRAI Benchmark =100%

Percentage cases resolved eeks

	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Percentage complaints resolved within 6 weeks	NA	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Percentage cases resolved in 6 weeks	NA	100.00%	100.00%	100.00%	92.00%	100.00%	NA	58.06%	100.00%	70.69%

■ Percentage complaints resolved within 6 weeks   ■ Percentage cases resolved in 6 weeks

Data Source: Billing Center of the operators

The benchmark for resolving 100% complaints within 6 weeks was not met by Reliance CDMA, Tata GSM and Vodafone.

9.3   PERIOD OF APPLYING CREDIT/WAVIER

9.3.1   PARAMETER DESCRIPTION

- Computational Methodology: **Period of applying credit waiver = (number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver) * 100**

- TRAI Benchmark: Period of applying credit waiver within 7 days: 100%

- Audit Procedure: Operator to provide details of:-

  ‣   List of all eligible cases along with

    - Date of applying credit waiver to all the eligible cases.

    - Date of resolution of complaint for all eligible cases

9.3.2   KEY FINDINGS
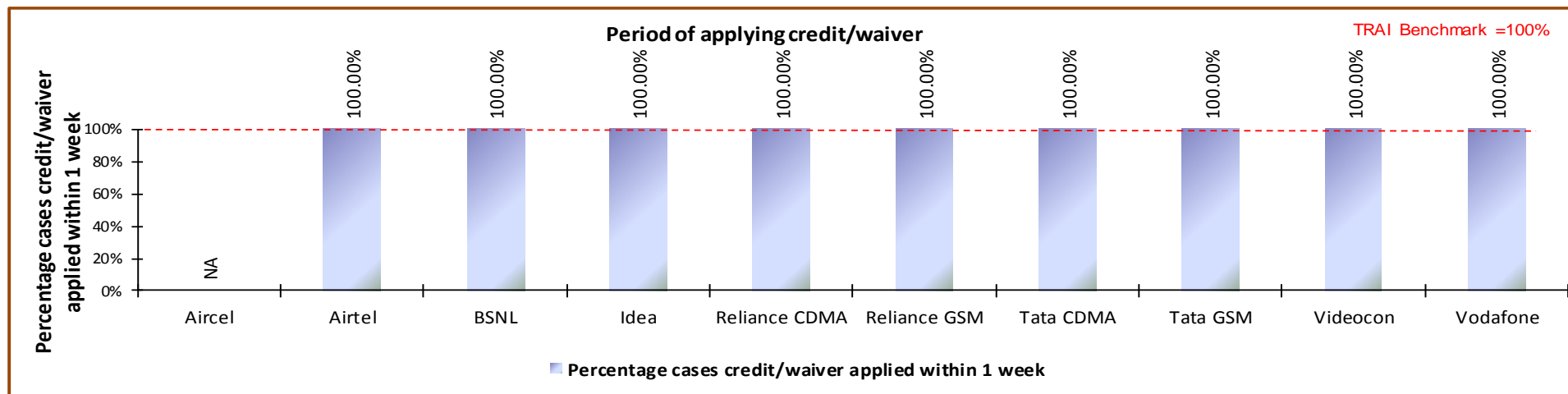
Data Source: Billing Center of the operators

All operators met the benchmark for this parameter.

9.4   CALL CENTRE PERFORMANCE-IVR

9.4.1   PARAMETER DESCRIPTION

- Computational Methodology: **Call centre performance IVR = (Number of calls connected and answered by IVR/ All calls attempted to IVR) * 100**

- TRAI Benchmark: >= 95%

- Audit Procedure: Operators provide details of the following from their central call centre/ customer service database:

    ‣   Total calls connected and answered by IVR

    ‣   Total calls attempted to IVR

    ↳   Also live calling is done to test the calls connected and answered by IVR

9.4.2   KEY FINDINGS
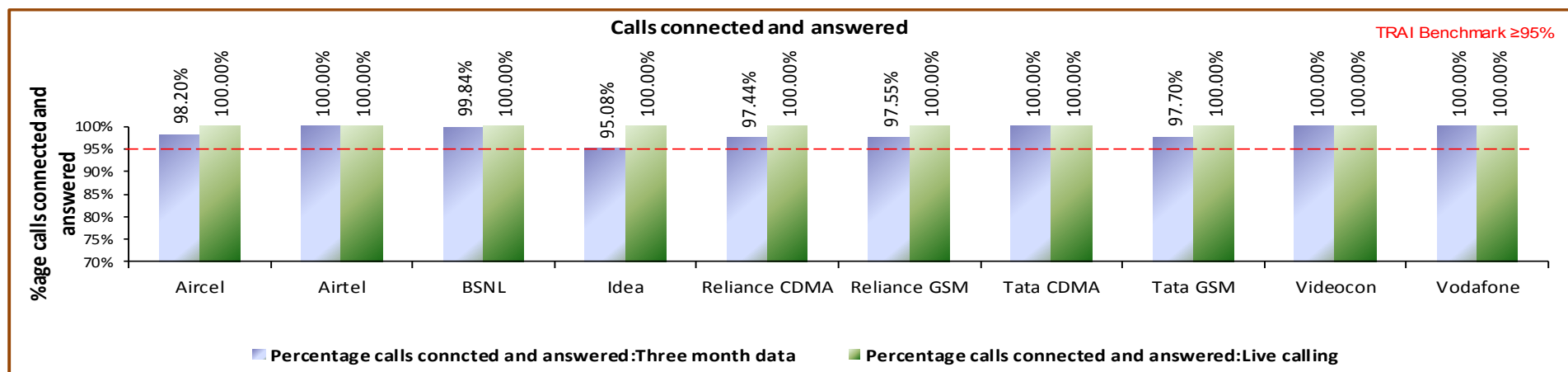
Data Source: Customer Service Center of the operators

As per PMR data, all operators met the benchmark.

9.5   CALL CENTRE PERFORMANCE-VOICE TO VOICE

9.5.1   PARAMETER DESCRIPTION

- ⮑ Computational Methodology:

    - ↳ Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100

- ⮑ Audit Procedure:

    - ↳ Operators provide details of the following from their central call centre/ customer service database:

        - ‣ Total calls connected and answered by operator within 90 seconds

        - ‣ Total calls attempted to connect to the operator

    - ↳ Also live calling was done to test the calls answered within 90 seconds by the operator

Benchmark: 95% calls to be answered within 90 seconds

9.5.2   KEY FINDINGS

Calls answered in 90 seconds (Voice to Voice)

TRAI Benchmark ≥ 95%

Operator	Percentage calls answered within 90 seconds (Avg of 3 months)	Live Calling Percentage calls getting connected and answered
Aircel	99.86%	100.00%
Airtel	82.25%	100.00%
BSNL	98.44%	100.00%
Idea	96.86%	100.00%
Reliance CDMA	86.06%	100.00%
Reliance GSM	92.18%	100.00%
Tata CDMA	99.52%	100.00%
Tata GSM	94.28%	100.00%
Videocon	96.84%	100.00%
Vodafone	99.27%	100.00%
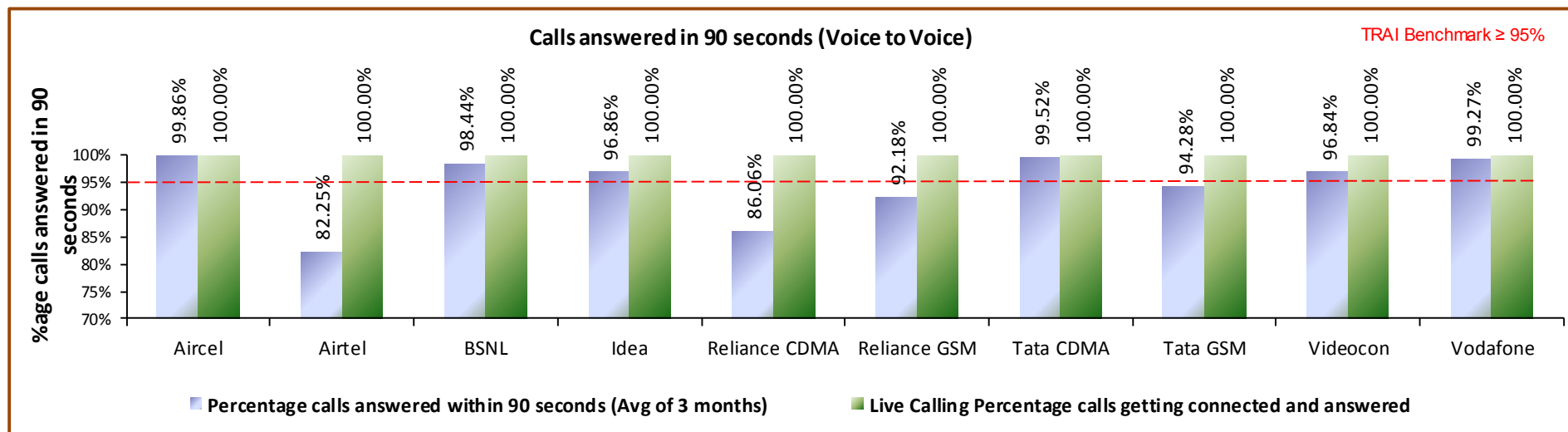
Data Source: Customer Service Center of the operators

Airtel, Reliance CDMA & GSM and Tata GSM did not meet the benchmark of answering 95% calls within 90 seconds.

Calls answered in 90 seconds (Voice to Voice)

TRAI Benchmark ≥ 95%

Operator	January	February	March
Aircel	99.48%	100.00%	100.00%
Airtel	95.58%	96.09%	
BSNL	98.64%	98.13%	98.55%
Idea	93.95%	99.25%	97.62%
Reliance CDMA	93.17%	83.17%	83.06%
Reliance GSM	93.02%	90.82%	92.71%
Tata CDMA	99.62%	99.63%	99.29%
Tata GSM	88.75%	95.83%	98.83%
Videocon	96.79%	96.45%	97.31%
Vodafone	99.01%	99.30%	99.52%

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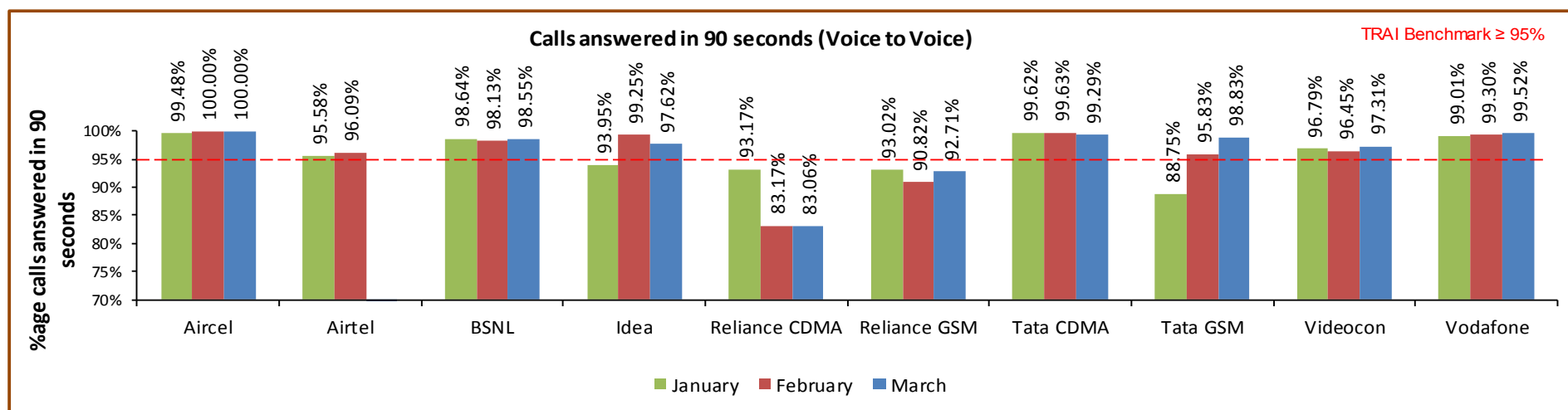
9.6   TERMINATION/CLOSURE OF SERVICE

9.6.1   PARAMETER DESCRIPTION

- ➲ Computational Methodology: **Time taken for closure of service = (number of closures done within 7 days/ total number of closure requests) * 100**

- ➲ TRAI Benchmark: Termination/Closure of Service: <=7 days

- ➲ Audit Procedure:

    - ↳ Operator provide details of the following from their central billing/CS database:

        - ➲ Date of lodging the closure request (all requests in given period)

        - ➲ Date of closure of service

9.6.2   KEY FINDINGS
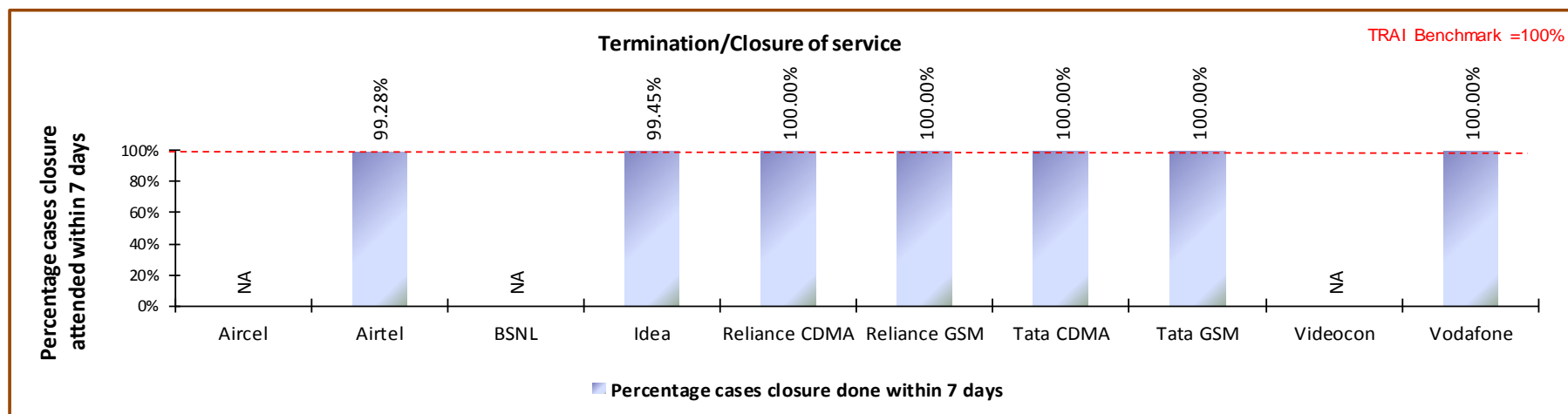
Data Source: Customer Service Center of the operators

Airtel failed to meet the TRAI benchmark for the parameter.

9.7   REFUND OF DEPOSITS AFTER CLOSURE

9.7.1   PARAMETER DESCRIPTION

- ⮑ Computational Methodology:

    - ↳ **Time taken for refund for deposit after closures = (number of cases of refund after closure done within 60 days/ total number of cases of refund after closure) * 100**

    - ↳ Any case where the operators need to return the amount back to consumers post closure of service in form of cheque/cash is considered to be refund.

- ⮑ TRAI Benchmark:

    - ↳ Time taken for refund for deposit after closures: 100% within 60 days

- ⮑ Audit Procedure:

    - ↳ Operator provide details of the following from their central billing/refund database:

        - ‣ Dates of completion of all 'closure requests' resulting in requirement of a refund by the operator.

        - ‣ Dates of refund pertaining to all closure request received during the relevant quarter

9.7.2 KEY FINDINGS
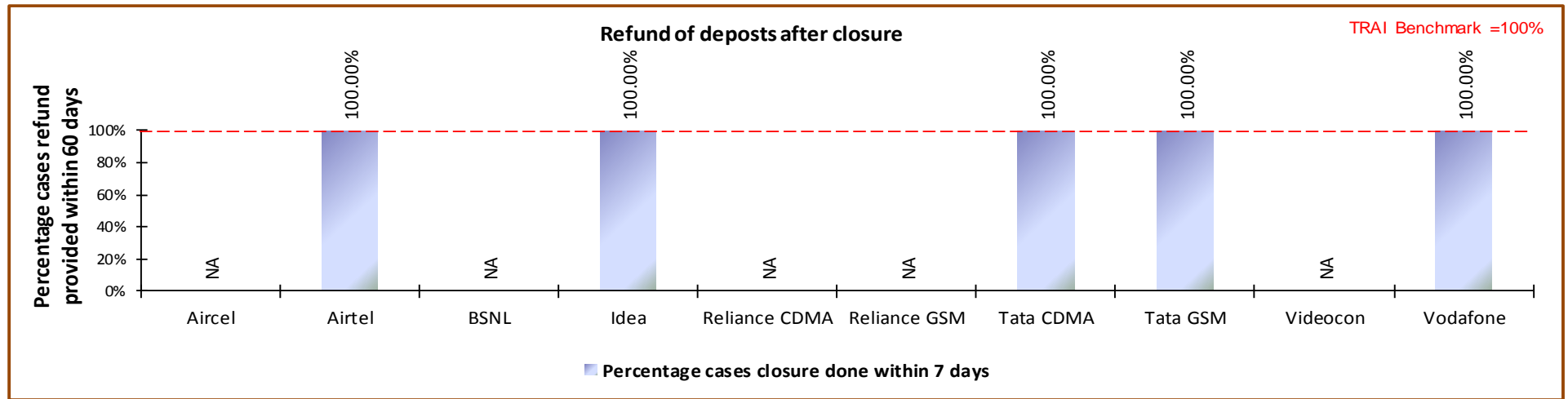
Refund of deposts after closure

TRAI Benchmark =100%

Percentage cases refund provided within 60 days

- Aircel — NA
- Airtel — 100.00%
- BSNL — NA
- Idea — 100.00%
- Reliance CDMA — NA
- Reliance GSM — NA
- Tata CDMA — 100.00%
- Tata GSM — 100.00%
- Videocon — NA
- Vodafone — 100.00%

■ **Percentage cases closure done within 7 days**

Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

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10 DETAILED FINDINGS - DRIVE TEST DATA

10.1 OPERATOR ASSISTED DRIVE TEST - VOICE

The drive test was conducted simultaneously for all the operators present in the MPCG circle. As per the new directive given by TRAI headquarters, drive test in the quarter were conducted at a SSA level. SSAs have been defined in two categories by TRAI as per the criticality of the SSA.

3. Normal SSA
4. Difficult SSA

The drive test in Normal SSA was conducted for three days with minimum distance of 250 kilometers over three days. The drive test in difficult SSAs was conducted for six days with minimum distance of 500 kilometers over six days. The selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected post discussion with TRAI regional teams. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

For measuring voice quality RxQual samples for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. RxQual greater than 5 meant that the sample was not of appropriate voice quality and for CDMA operators FERs of more than 4 were considered bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in Dbm with strength > -75 dbm for indoor, -85 dbm for in-vehicle and > -95 dbm outdoor routes.

The schedule and operators involved in the operator assisted drive test for MPCG circle are given below.

Name of Operator	Name of Operator
Aircel	Airtel 3G
Airtel	BSNL 3G
BSNL	Idea 3G
Idea	TATA 3G
Reliance CDMA	
Reliance GSM	
TATA CDMA	
TATA GSM	
Videocon	

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10.1.1 DAMOH SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
January	Damoh	14/1/2016	16/1/2016	355

10.1.1.1 Route Details – DAMOH SSA

Category	Type of location	January Damoh		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	(Main Market Road, Railway Station Road, Railway Station, Rajwan Road)	(Damoh Road, Market Road, Bus Stand Road)	(Main Market, Bus Stand Road, Damoh Bypass, Jabalpur Road, Damoh Road)
	Highways	(Bandakpur Road, Sagar Road, Jabalpur Road, Katni Road, Bus Stand, Abhana	(Damoh Road , Patera Road, Panna Raod)	(Damoh Road, Jabalpur Road, Bypass Road)
	With in the City	(Bus Stand, Ghantaghar, Bandakpur Road, Hatta Road, Railway Yard, Railway Station, Tidoni, Tandon Bagicha, Vijay Nagar, Collectorate, Main Market, Hirdepur, Saraswati Colony, Mukesh Colony, Subhash Colony, Mukharji Nagar, Vaishali Nagar)	(Bus Stand, Main Market, Navghat, Khatik Mohalla, Raj Chawk)	Bus Stand, Market Road, Burtan Wali Gali, Mandir Gali, Jabalpur Road, MPEB Office Roa
Indoor	Shopping complex			
	Office complex			

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The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

10.1.1.2 Route Map - DAMOH DAY 1

Rx Level Plot –Day-1

Date of Drive Test- 14/01/2016

Name of the SDCAs covered – Damoh

Route Covered- day 1

Jabalpur Road, Patera Road, Hatta Road ,Narsinghgarh Road, Sagar Road , Bus Stand, Railway Station

Rx Level Full
- 0 to -75
- -75 to -85
- -85 to -95
- -95 to -120
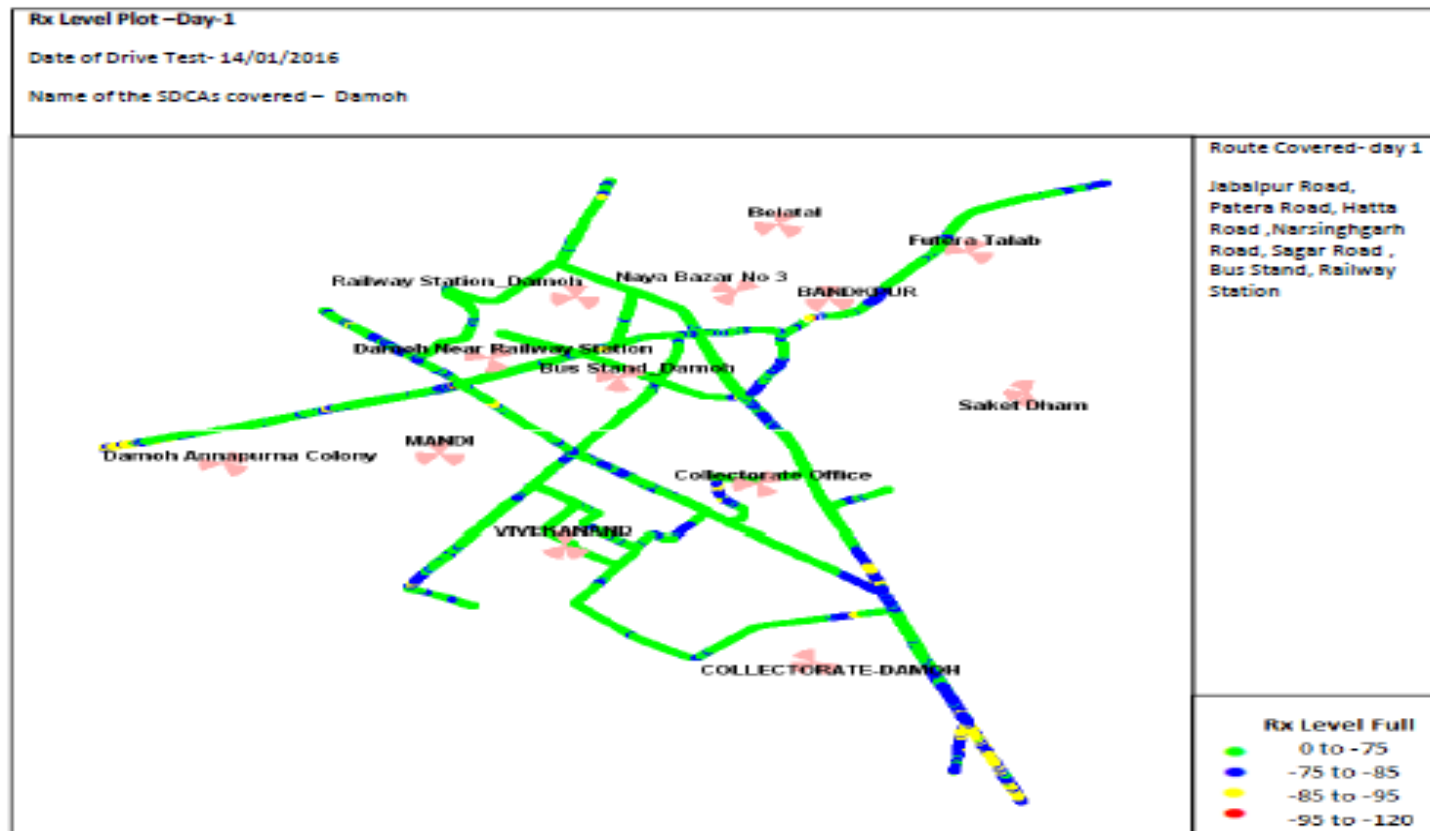
10.1.1.3 Route Map - DAMOH DAY 2

Rx Level Plot –Day-2

Date of Drive Test- 15/01/2016

Name of the SDCAs covered – Hatta

Route Covered- day 2

Damoh Road,
Patera Road,
Amangunj Road,
Police station, Bus
Stand, MLB School

Naka Mandir

Hatta

MLB School_Hatta

Rx Level Full
- 0 to -75
- -75 to -85
- -85 to -95
- -95 to -120

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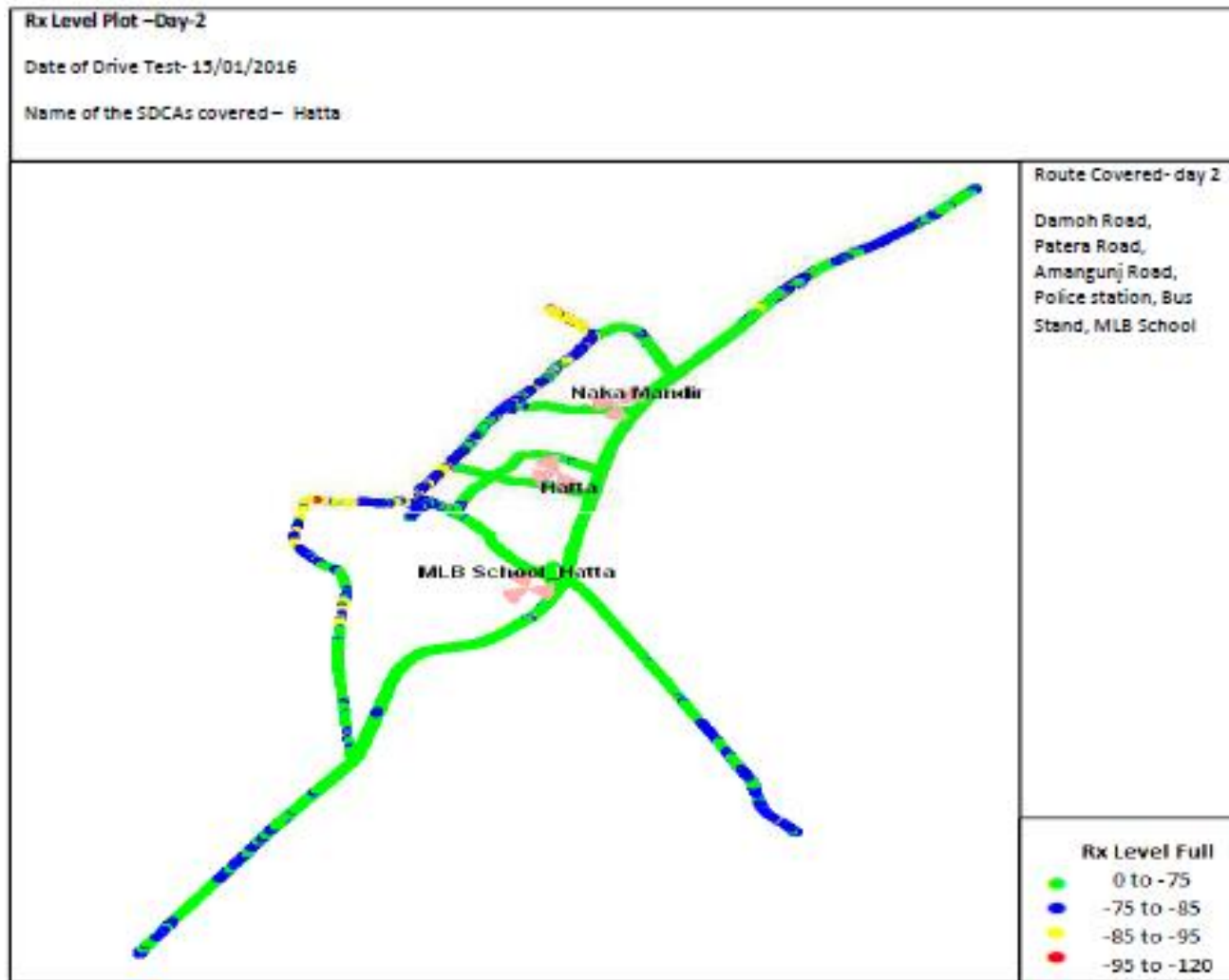
10.1.1.1 Route Map - DAMOH DAY 3

Rx Level Plot –Day-3

Date of Drive Test- 16/01/2016

Name of the SDCAs covered – Jabera

Route Covered- day 3

Damoh Road, Jabalpur Road, Bus stand, Police Station

MPSHXXXXX053B-56

Rx Level Full

- 0 to -75
- -75 to -85
- -85 to -95
- -95 to -120
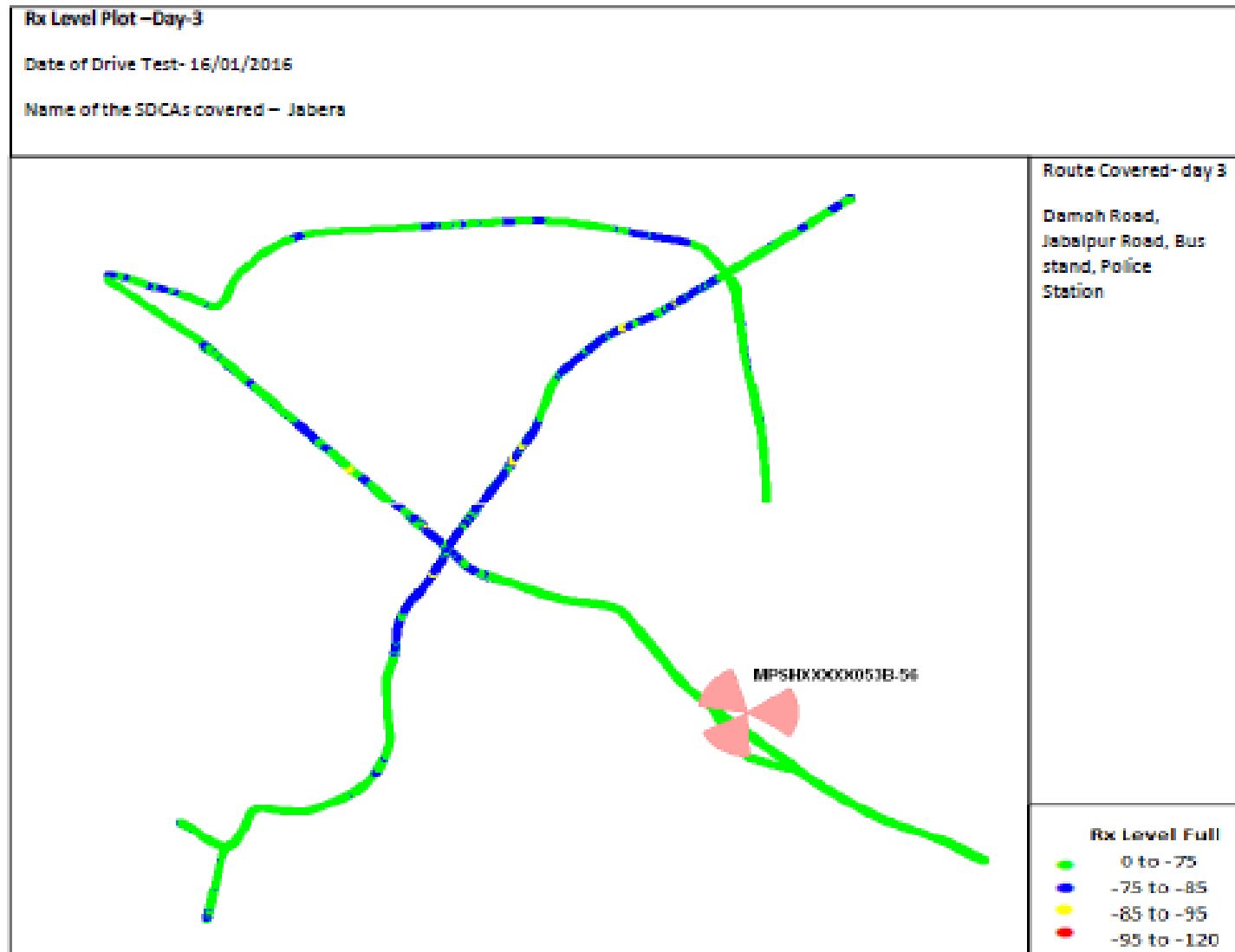
10.1.1.2 Drive Test Results - DAMOH SSA 2G

Damoh	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		98.38%	34.52%	76.58%	57.03%	42.14%	52.11%	59.41%	62.74%	66.47%	62.39%	64.52%	66.51%	99.03%	42.17%	93.50%	92.37%	95.48%	81.95%	99.98%	82.30%
0 to -85 dBm		100.00%	67.64%	95.04%	87.52%	94.38%	81.68%	97.98%	93.89%	79.48%	84.67%	92.90%	91.44%	100.00%	77.84%	99.74%	98.98%	99.94%	98.18%	100.00%	98.30%
0 to -95 dBm		100.00%	94.12%	97.66%	96.55%	99.24%	97.40%	99.87%	99.75%	99.63%	98.66%	99.88%	99.57%	100.00%	96.76%	100.00%	99.95%	100.00%	99.95%	100.00%	99.66%
Voice quality	≥ 95%	99.36%	99.24%	99.46%	98.63%	98.96%	97.87%	99.02%	97.49%	99.85%	99.76%	99.26%	95.02%	100.00%	100.00%	99.60%	98.37%	99.96%	97.73%	99.03%	97.99%
CSSR	≥ 95%	100.00%	98.11%	100.00%	100.00%	98.33%	98.95%	100.00%	99.40%	100.00%	100.00%	100.00%	98.36%	100.00%	100.00%	100.00%	99.70%	100.00%	99.66%	100.00%	100.00%
%age Blocked calls		0.00%	1.89%	0.00%	0.00%	1.67%	1.05%	0.00%	0.60%	0.00%	0.00%	0.00%	1.64%	0.00%	0.00%	0.00%	0.30%	0.00%	0.34%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	5.77%	0.00%	0.00%	0.00%	0.71%	0.00%	0.00%	0.00%	0.00%	0.00%	1.34%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	99.52%	100.00%	99.77%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.78%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

All operators met the benchmark in outdoor locations in Damoh SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR in Damoh SSA

Call Drop Rate

Aircel failed to meet the benchmark for call drop rate in Damoh SSA.

10.1.1.1 Drive Test Results - DAMOH SSA 3G

Damoh	B'mark	Airtel		BSNL		Idea		Tata 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm				NA	5.69%	79.64%	66.35%	99.50%	53.46%
0 to -85 dBm				NA	19.07%	99.68%	90.64%	100.00%	91.73%
0 to -95 dBm				NA	56.45%	100.00%	98.72%	100.00%	99.97%
Voice quality	≥ 95%	No Coverage		NA	73.60%	99.97%	96.33%	99.99%	99.34%
CSSR	≥ 95%			NA	100.00%	100.00%	99.66%	100.00%	100.00%
%age Blocked calls				NA	0.00%	0.00%	0.34%	0.00%	0.00%
Call drop rate	≤ 2%			NA	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				NA	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL 3G failed to meet the benchmark in outdoor locations in Damoh SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Damoh SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Damoh SSA.

10.1.1.1 Data Drive Test Results - DAMOH SSA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100.00%	100.00%	NDR	100.00%	NDR	NDR	NDR	NDR	100.00%	100.00%
Succesful Data Transmission upload speed attempts	>75%	100.00%	100.00%	NDR	100.00%	NDR	NDR	NDR	NDR	100.00%	100.00%
Minimum download speed		149.13	101.00	NDR	116.98	NDR	NDR	NDR	NDR	72.80	104.64
Average throughput for Packet Data		203.02	128.00	NDR	153.99	NDR	NDR	NDR	NDR	147.11	178.50
Latency	<250ms	100.00	100.00	NDR	100.00	NDR	NDR	NDR	NDR	100.00	100.00

All operators met the TRAI benchmark

10.1.1.2 Data Drive Test Results - DAMOH SSA 3G

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA
Succesful Data Transmission download speed attempts	>80%	NDR	NDR	100.00%	NDR
Succesful Data Transmission upload speed attempts	>75%	NDR	NDR	100.00%	NDR
Minimum download speed		NDR	NDR	1257.00	NDR
Average throughput for Packet Data		NDR	NDR	1902.14	NDR
Latency	<250ms	NDR	NDR	100.00	NDR

All operators met the TRAI benchmark

10.1.2 MPCG ITARSI SSA

10.1.2.1 KILOMETERS TRAVELLED- ITARSI SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
January	ITARSI	27/1/2016	29/1/2016	335

10.1.2.2 ROUTE DETAILS - ITARSI SSA

Category	Type of location	January ITARSI		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	((Satrasta Chowk, Itwara Bazar,Sadat Bazar, Kothi Bazar)	(Harda Road,Baipass, road, Bus stand)	(Pipariya Road, Hoshngabad Road , Bus Stand)
	Highways	(Itrasi Road, Bhopal Road, Pipariya Road)	(Itarsi Road, Harda Road)	(Pipariya Road, Hoshngabad Road)
	With in the City	(Bus Stand,Yard ,Gandhi Nagar,Ward No. 4)	(Bus Stand, Main Market,)	(Main Market,Bus Stand)
Indoor	Shopping complex			
	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

10.1.2.3 Route Map - ITARSI DAY 1

10.1.2.4 Route Map - ITARSI DAY 2
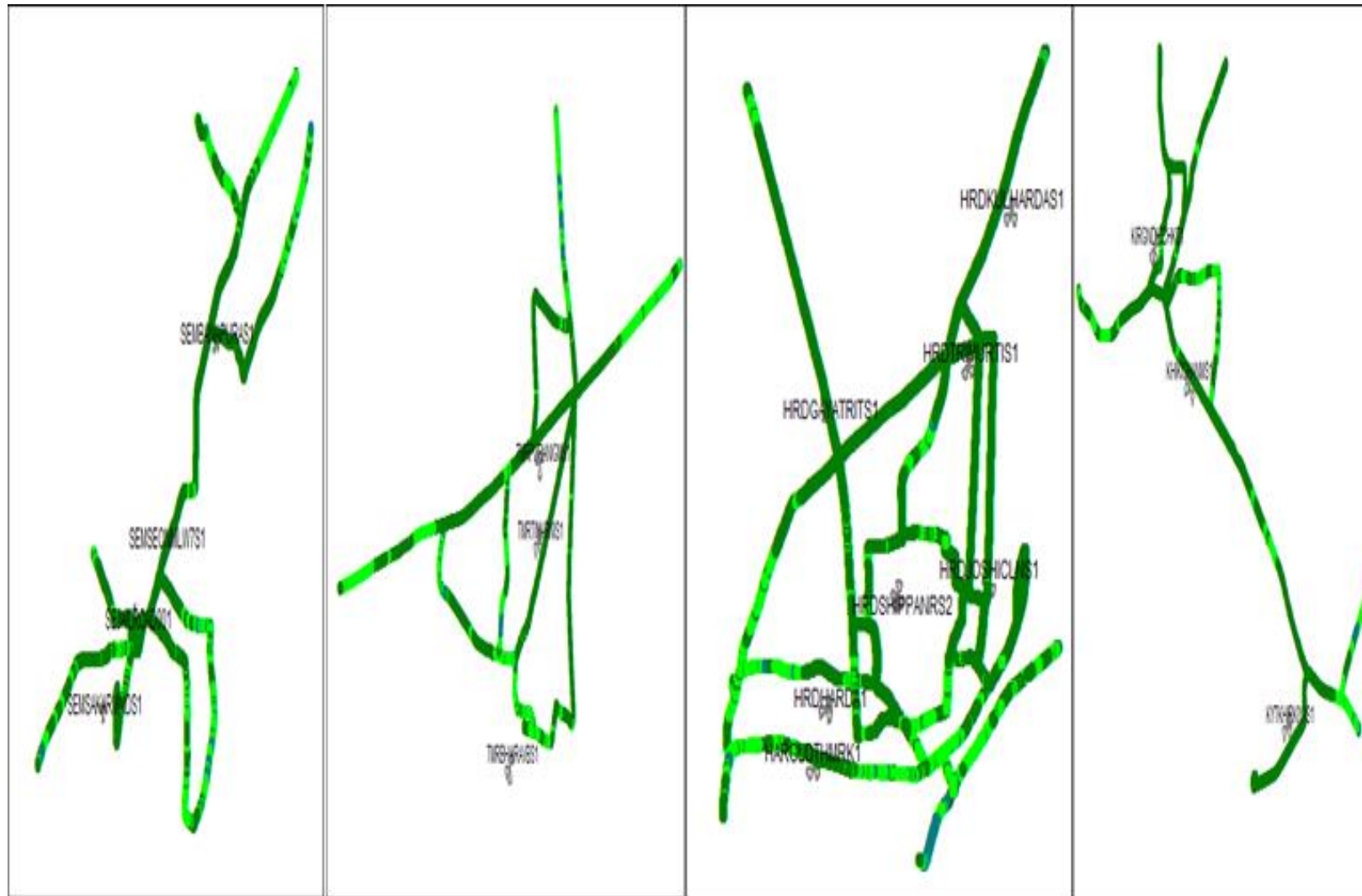
10.1.2.5 Route Map - ITARSI DAY 3

10.1.2.6 Drive Test Results - ITARSI SSA 2G

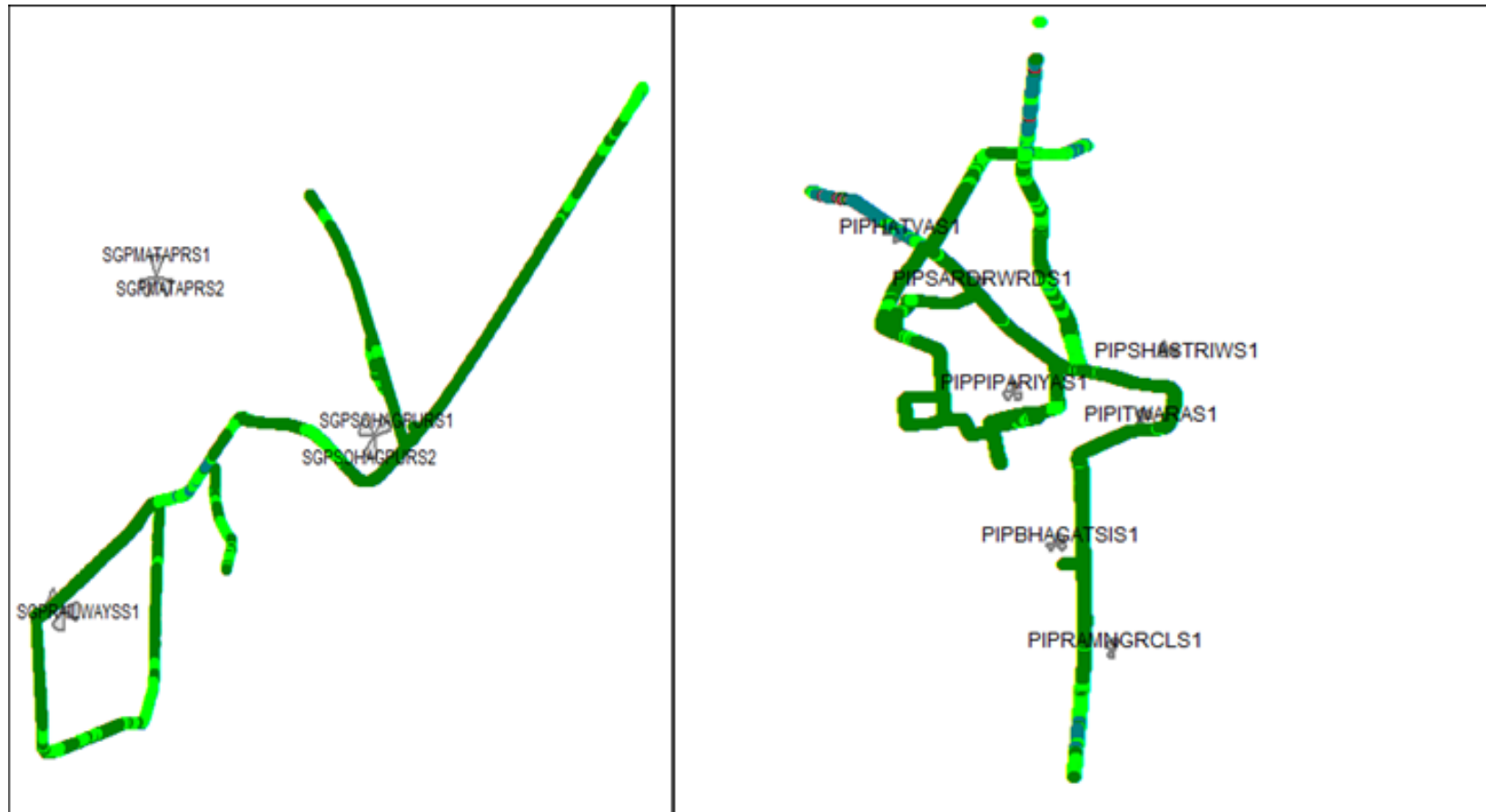| Itarsi	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		87.34%	88.56%	94.97%	76.79%	100.00%	95.40%	92.79%	99.35%	91.71%	66.31%	82.38%	86.12%	100.00%	77.72%	99.99%	92.61%	92.98%	78.89%	99.76%	79.89%
0 to -85 dBm		99.88%	96.96%	99.88%	94.77%	100.00%	97.07%	100.00%	100.00%	96.52%	93.08%	95.22%	98.62%	100.00%	89.87%	100.00%	98.62%	99.67%	96.04%	100.00%	97.84%
0 to -95 dBm		100.00%	99.91%	99.90%	98.41%	100.00%	99.04%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.83%	100.00%	99.83%	100.00%	99.80%	100.00%	99.96%
Voice quality	≥ 95%	99.71%	97.66%	99.66%	98.36%	100.00%	100.00%	98.51%	96.89%	98.21%	95.16%	97.55%	94.68%	100.00%	100.00%	98.82%	97.62%	98.83%	96.76%	99.19%	98.65%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.18%	100.00%	100.00%	100.00%	99.81%	100.00%	99.54%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.82%	0.00%	0.00%	0.00%	0.39%	0.00%	0.46%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.27%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.09%	100.00%	100.00%	100.00%	99.36%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Reliance GSM failed to meet the benchmark in outdoor locations in Itarsi SSA

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR in outdoor locations in Itarsi SSA

Call Drop Rate

All operators met the benchmark for call drop rate in outdoor locations in Itarsi SSA

10.1.2.1 Drive Test Results - ITARSI SSA 3G

Itarsi	B'mark	Airtel		BSNL		Idea		Tata 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm				3.91%	2.66%	87.57%	85.86%	100.00%	99.73%
0 to -85 dBm				47.04%	13.03%	100.00%	98.99%	100.00%	99.97%
0 to -95 dBm				78.99%	46.88%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	No Coverage		100.00%	71.76%	98.55%	96.47%	100.00%	98.71%
CSSR	≥ 95%			98.72%	98.47%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls				1.28%	1.53%	0.00%	0.00%	0.00%	0.34%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	97.12%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL 3G failed to meet the benchmark in outdoor locations in Itarsi SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Itarsi SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Itarsi SSA

10.1.2.1 Data Drive Test Results - ITARSI SSA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100.00%	100.00%	NDR	100.00%	NDR	NDR	NDR	NDR	100.00%	100.00%
Succesful Data Transmission upload speed attempts	>75%	100.00%	100.00%	NDR	100.00%	NDR	NDR	NDR	NDR	100.00%	100.00%
Minimum download speed		111.10	103.00	NDR	119.51	NDR	NDR	NDR	NDR	55.00	102.83
Average throughput for Packet Data		120.19	132.00	NDR	168.27	NDR	NDR	NDR	NDR	138.00	150.07
Latency	<250ms	100.00	100.00	NDR	100.00	NDR	NDR	NDR	NDR	100.00	100.00

All operators met the TRAI benchmark.

10.1.2.1 Data Drive Test Results - ITARSI SSA 3G

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA
Succesful Data Transmission download speed attempts	>80%	NDR	NDR	100.00%	NDR
Succesful Data Transmission upload speed attempts	>75%	NDR	NDR	100.00%	NDR
Minimum download speed		NDR	NDR	975.72	NDR
Average throughput for Packet Data		NDR	NDR	1607.43	NDR
Latency	<250ms	NDR	NDR	100.00	NDR

All operators met the TRAI benchmark.

10.1.3 JHABUA SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
January	JHABUA	20/1/2016	23/1/2016	360

10.1.3.1 Route Details – JHABUA SSA

Category	Type of location	January JHABUA		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	(Jobat road, Bus stand, Para raod)	Sondwa road, collectorate)	(Bus stand, Megh nagar road)
	Highways	(Petlawad road, Maghnagar road, Indore road)	(Jobat road , Kukshi road, Sondwa road & Gujrat road)	(Megh nagar road, Bamaniya road, petlaead road)
	With in the City	(Bus Stand, Ramkrishnagar, Rajwada chowk, Gopal colony	(Bus Stand, Main Market,)	(Bus stand, Main market, Bhamaniya road)
Indoor	Shopping complex			
	Office complex			

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10.1.3.2 Route Map - JHABUA DAY 1

Route Covered

1 – JHABUA ROAD

2 – MARKET

3 – Bus Stand

4 – PETLAWAD ROAD

5- Civil Line

6-Main market

7 –Indore road
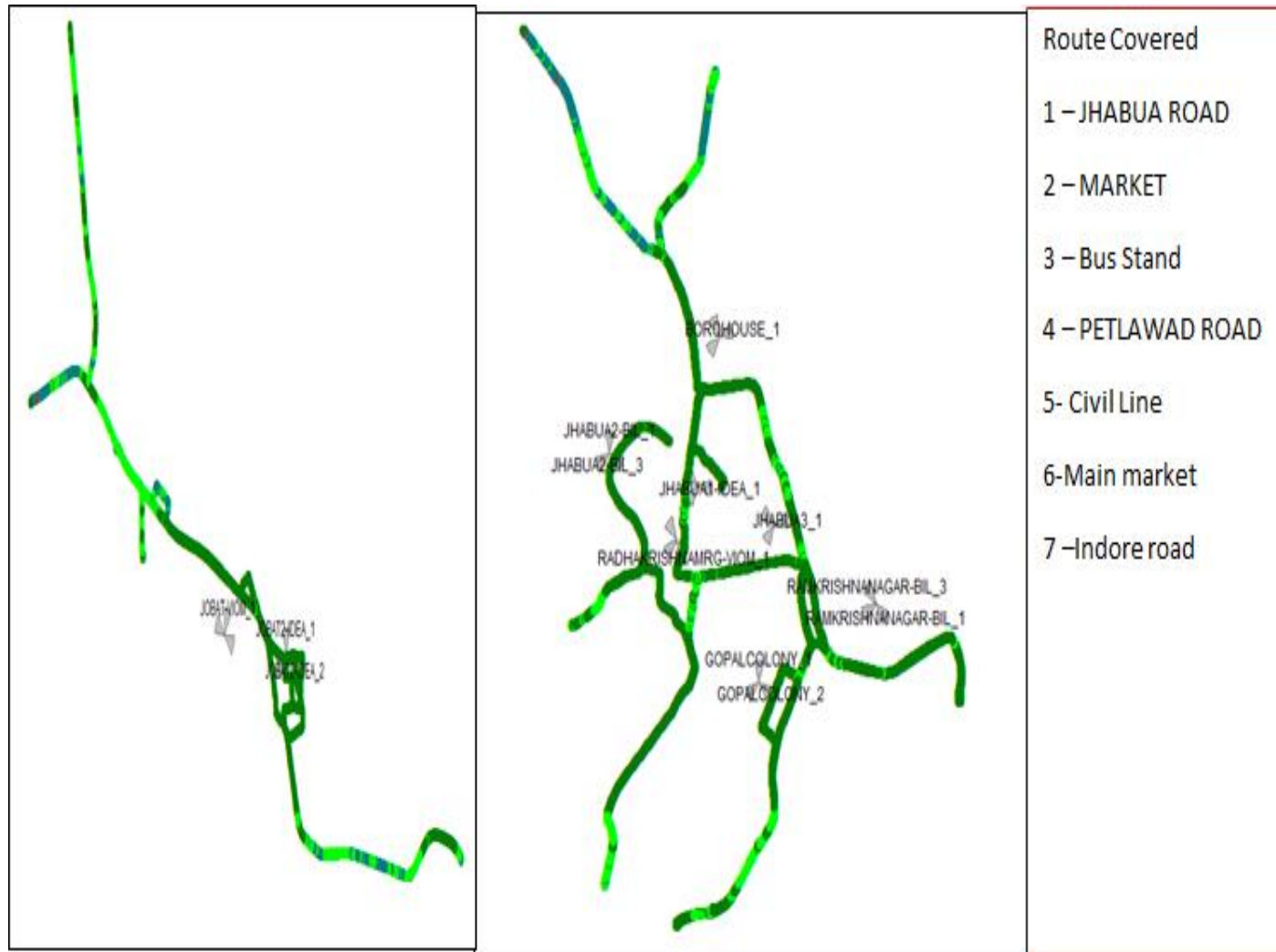
10.1.3.3 Route Map - JHABUA DAY 2

Route Covered

1 – JHABUA ROAD

2 – MARKET

3 – Bus Stand

4 – PETLAWAD ROAD

5- Civil Line

6-Main market

7 –Indore road

RXLEV_FdB

- -75 to 0
- -85 to -75
- -95 to -85
- -120 to -95

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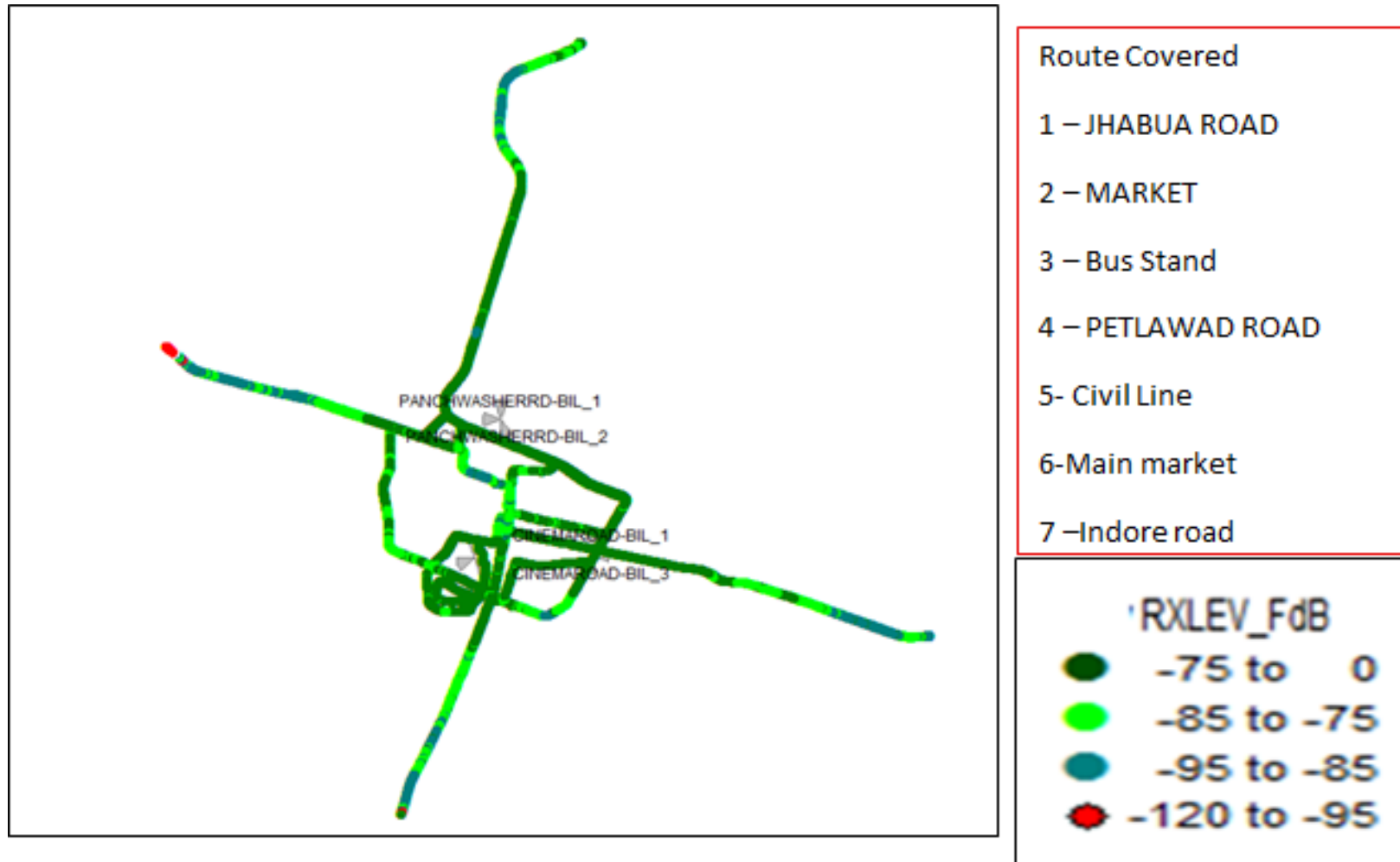
10.1.3.4 Route Map - JHABUA DAY 3

Route Covered

1 – JHABUA ROAD

2 – MARKET

3 – Bus Stand

4 – PETLAWAD ROAD

5- Civil Line

6-Main market

7 –Indore road

RXLEV_FdB

- ⬤ -75 to   0
- ⬤ -85 to -75
- ⬤ -95 to -85
- ⬤ -120 to -95
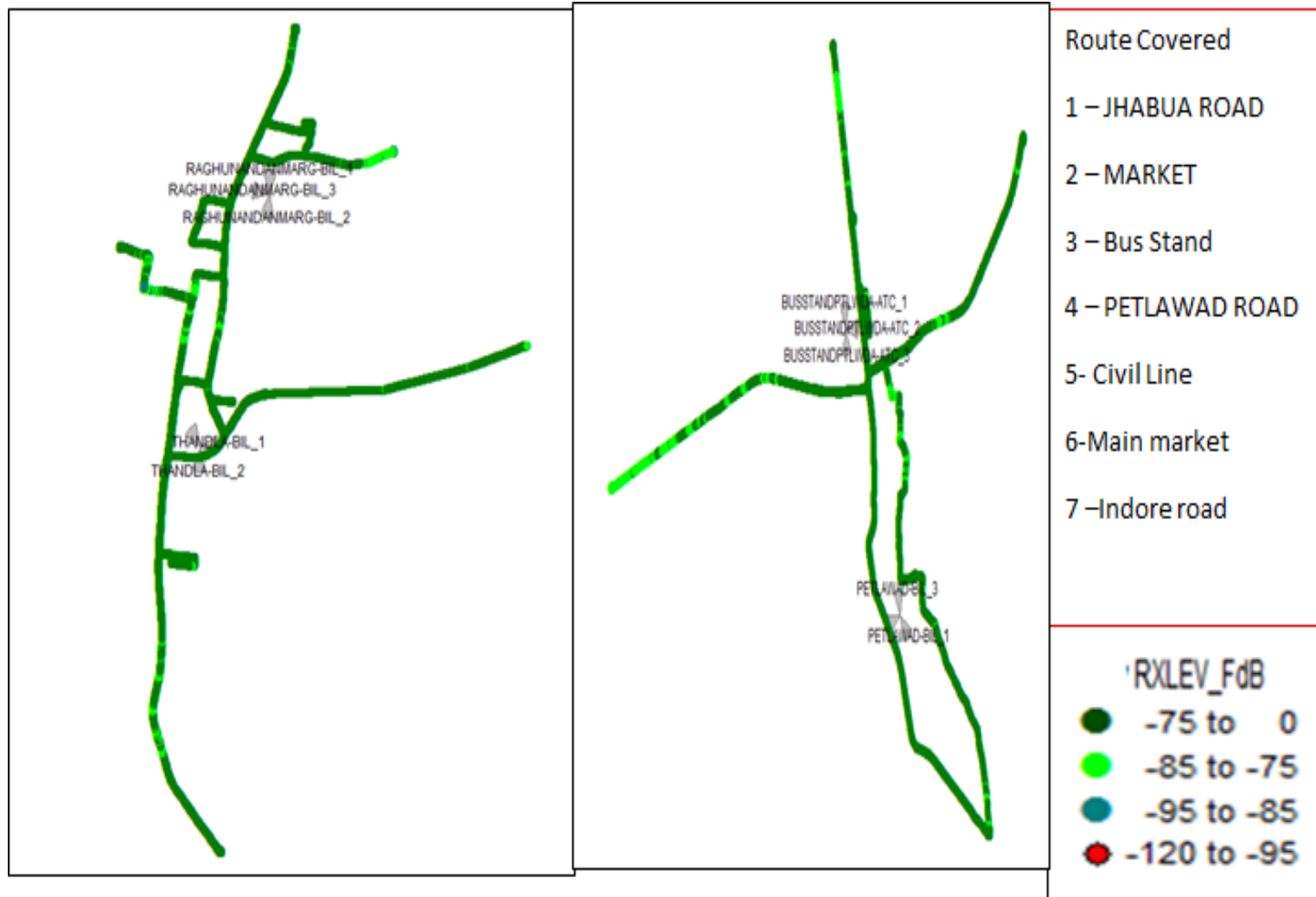
10.1.3.1 Drive Test Results - JHABUA SSA 2G

Jhabua	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Coverage		70.69%	74.21%	95.96%	65.56%	92.60%	76.24%	96.95%	74.94%	95.62%	78.74%	97.58%	85.29%	97.58%	85.29%	96.18%	79.07%	100.00%	92.39%
0 to -85 dBm				83.83%	92.31%	100.00%	89.19%	99.79%	95.56%	100.00%	94.61%	99.91%	96.10%	100.00%	97.52%	100.00%	97.52%	99.96%	96.77%	100.00%	98.45%
0 to -95 dBm				86.28%	96.15%	100.00%	99.04%	100.00%	99.79%	100.00%	99.59%	100.00%	99.76%	100.00%	99.97%	100.00%	99.97%	100.00%	99.90%	100.00%	99.95%
Voice quality	≥ 95%			98.42%	97.75%	99.28%	96.86%	98.61%	97.27%	99.85%	98.92%	100.00%	96.58%	99.42%	97.44%	99.42%	97.44%	99.62%	98.93%	99.56%	98.67%
CSSR	≥ 95%			100.00%	100.00%	98.31%	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	1.69%	2.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	0.51%	0.00%	0.00%	0.00%	0.00%	0.00%	1.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	88.78%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations in Jhabua SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Jhabua SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Jhabua SSA

10.1.3.2 Drive Test Results - JHABUA SSA 3G

Jhabua	B'mark	Airtel		BSNL		Idea		Tata 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm				41.28%	36.81%	82.00%	86.87%	100.00%	79.61%
0 to -85 dBm				100.00%	71.55%	99.96%	97.81%	100.00%	95.20%
0 to -95 dBm				100.00%	95.94%	100.00%	99.95%	100.00%	98.51%
Voice quality	≥ 95%	No Coverage		100.00%	99.35%	98.32%	97.93%	100.00%	99.79%
CSSR	≥ 95%			100.00%	99.35%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls				0.00%	0.65%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations in Jhabua SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Jhabua SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Jhabua SSA

10.1.3.1 Data Drive Test Results - JHABUA SSA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	NDR	100.00%	100.00%	NDR	NDR	NDR	100.00%	NDR	100.00%	100.00%
Succesful Data Transmission upload speed attempts	>75%	NDR	100.00%	100.00%	NDR	NDR	NDR	100.00%	NDR	100.00%	100.00%
Minimum download speed		NDR	102.31	49.12	NDR	NDR	NDR	49.00	NDR	61.14	130.50
Average throughput for Packet Data		NDR	134.65	71.00	NDR	NDR	NDR	131.78	NDR	130.67	182.45
Latency	<250ms	NDR	100.00	NDR	NDR	NDR	NDR	100.00	NDR	100.00	100.00

All operators met the TRAI benchmark.

10.1.3.2 Data Drive Test Results - JHABUA SSA 3G

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA
Succesful Data Transmission download speed attempts	>80%	NDR	100.00%	NDR	100.00%
Succesful Data Transmission upload speed attempts	>75%	NDR	100.00%	NDR	100.00%
Minimum download speed		NDR	528.16	NDR	2033.00
Average throughput for Packet Data		NDR	635.86	NDR	2564.70
Latency	<250ms	NDR	100.00	NDR	100.00

All operators met the TRAI benchmark.

10.1.4 SAGAR SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
January	Sagar	01-11-2016	13/1/2016	325

10.1.4.1 Route Details – SAGAR SSA

Category	Type of location	January Sagar		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Bada Bazar,Tili ward,Makronia	(Sagar road, Bus stand,)	(Sagar Road,Main Market,College Road)
	Highways	(Bhopal Road,Jhansi Road, Chhatarpur road)	(Sagar road, Bina road)	(Sagar Road,Damoh Road)
	With in the City	(Bus Stand, 3 Batti, Bada Bazar,Makronia)	(Bus Stand, Main Market,)	(Main Market,Bus Stand)
Indoor	Shopping complex			
	Office complex			

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10.1.4.1 Route Map - SAGAR DAY 1
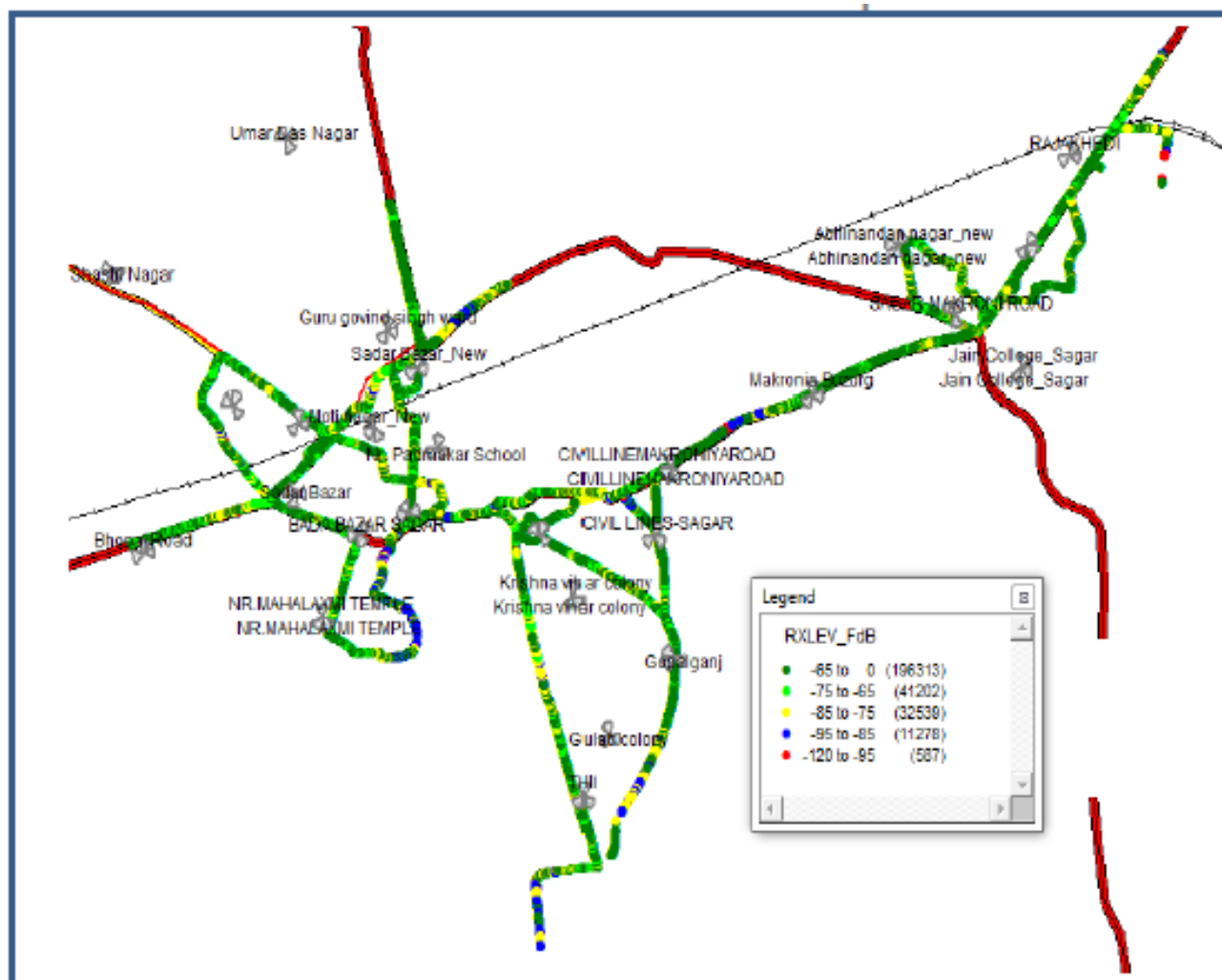
Sagar road,chandshaker Bard,bada bazar, Laxmi pura,parkota, Shnichri hill, Tilak gang Ekta colony Sadar bazar, Bittalnagar Rajakhadi
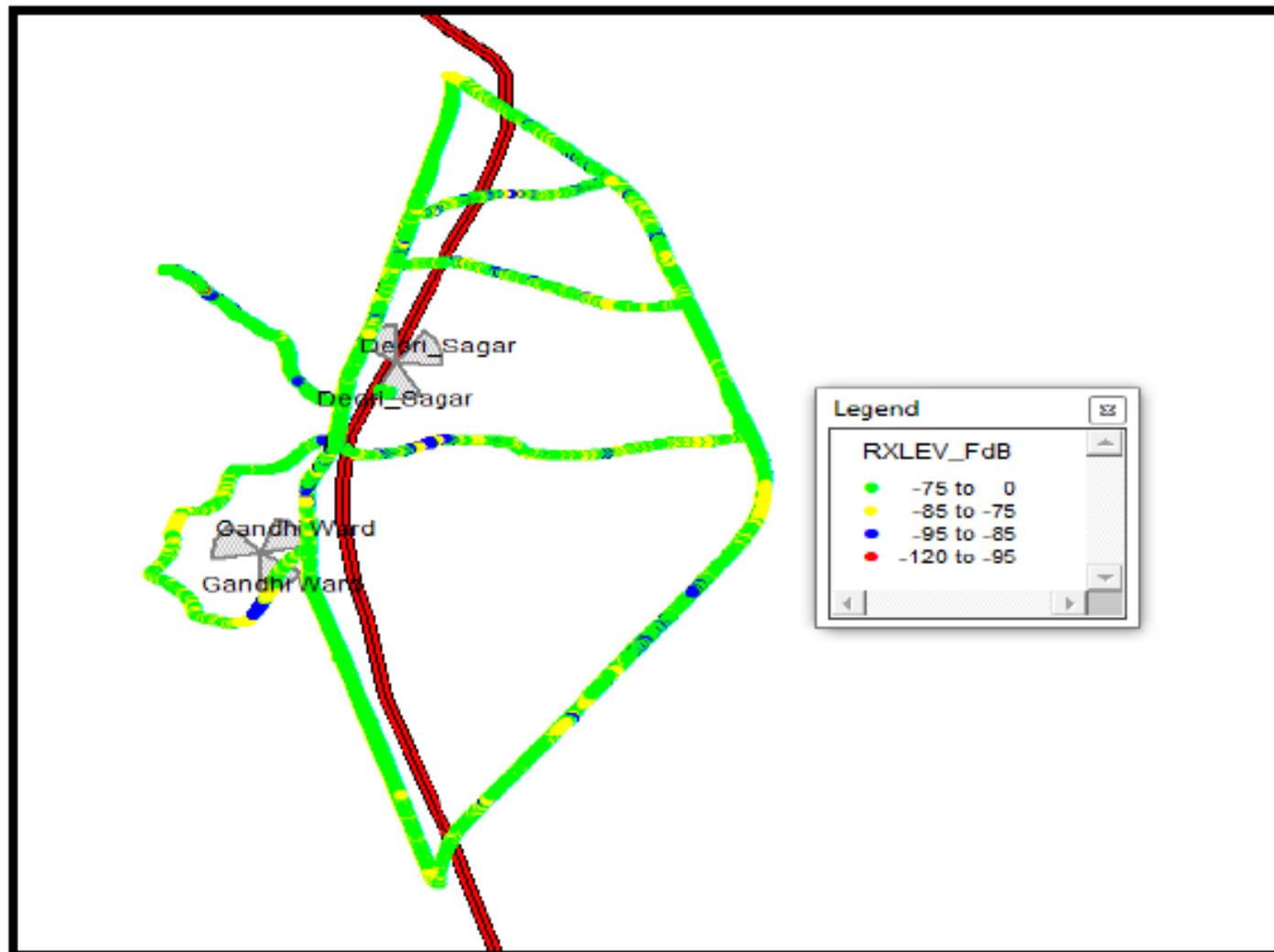
10.1.4.2 Route Map - SAGAR DAY 2
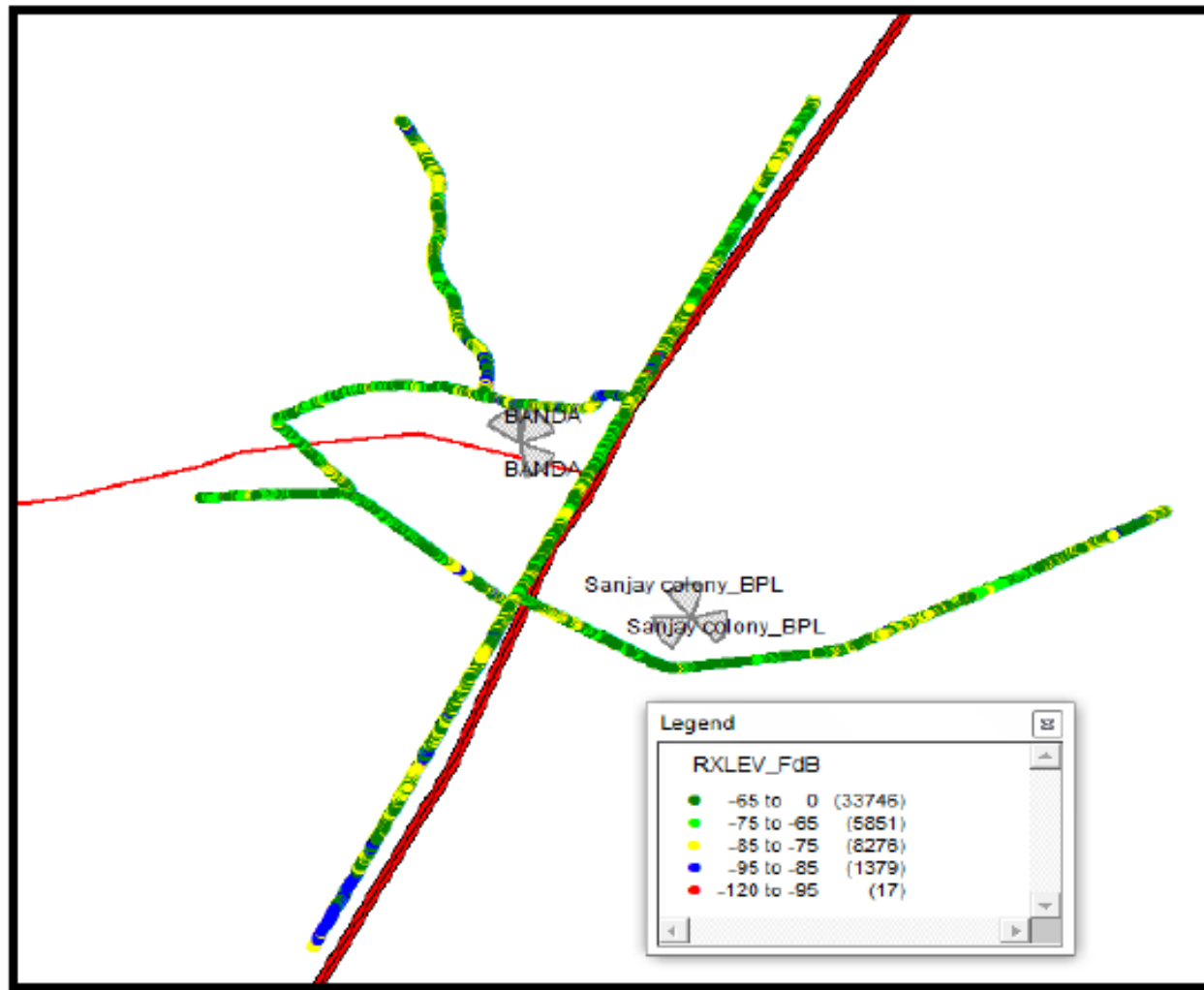
Bandashapur
road
,market,
Bus stand
Nh 86

10.1.4.1 Route Map - SAGAR DAY 3

10.1.4.2 Drive Test Results - SAGAR SSA 2G

Sagar	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		95.15%	71.91%	86.91%	74.67%	64.58%	53.14%	99.83%	97.14%	75.15%	83.76%	84.22%	86.99%	61.68%	43.97%	94.92%	85.20%	84.52%	75.35%	99.99%	88.11%
0 to -85 dBm		100.00%	99.17%	96.98%	93.94%	97.78%	87.01%	100.00%	99.97%	98.37%	98.98%	99.65%	99.28%	87.38%	88.34%	99.68%	95.83%	99.81%	94.08%	100.00%	98.81%
0 to -95 dBm		100.00%	100.00%	98.85%	98.01%	99.94%	99.08%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.76%	99.99%	99.86%	100.00%	99.75%	100.00%	99.62%
Voice quality	≥ 95%	99.63%	99.65%	97.91%	97.99%	98.90%	96.53%	99.81%	95.72%	97.54%	95.45%	97.08%	92.14%	100.00%	100.00%	98.64%	96.93%	98.82%	96.95%	99.41%	97.15%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	99.65%	100.00%	100.00%	100.00%	100.00%	100.00%	98.91%	100.00%	100.00%	100.00%	99.67%	100.00%	99.24%	100.00%	99.71%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.35%	0.00%	0.00%	0.00%	0.00%	0.00%	1.09%	0.00%	0.00%	0.00%	0.33%	0.00%	0.25%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	1.04%	0.00%	0.00%	0.00%	0.38%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	91.15%	100.00%	99.68%	100.00%	100.00%	100.00%	99.64%	100.00%	100.00%	100.00%	100.00%	100.00%	99.57%	100.00%	100.00%

Voice Quality

Reliance GSM failed to meet the benchmark in outdoor locations in Sagar SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Sagar SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Sagar SSA

10.1.4.3 Drive Test Results - SAGAR SSA 3G

January	B'mark	Airtel		BSNL		Idea		Tata 3G	
Sagar		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Parameter's				0.00%	6.50%	100.00%	76.23%	97.97%	50.81%
0 to -75 dBm				1.55%	20.20%	100.00%	98.40%	100.00%	85.17%
0 to -85 dBm				98.45%	61.45%	100.00%	99.97%	100.00%	98.98%
0 to -95 dBm		No Coverage		100.00%	74.87%	99.81%	96.89%	100.00%	99.81%
Voice quality	≥ 95%			100.00%	93.93%	100.00%	100.00%	100.00%	100.00%
CSSR	≥ 95%			100.00%	96.19%	100.00%	99.98%	100.00%	100.00%
%age Blocked calls				0.00%	1.29%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	6.07%	0.00%	0.00%	0.00%	0.65%
Hands off success rate				100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

BSNL 3G failed to meet the benchmark in outdoor locations in Sagar SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Sagar SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Sagar SSA

10.1.4.1 Data Drive Test Results - SAGAR SSA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100.00%	100.00%	NDR	100%	NDR	NDR	NDR	NDR	100.00%	100.00%
Succesful Data Transmission upload speed attempts	>75%	100.00%	100.00%	NDR	100%	NDR	NDR	NDR	NDR	100.00%	100.00%
Minimum download speed		121.32	102.43	NDR	98.20	NDR	NDR	NDR	NDR	69.81	83.96
Average throughput for Packet Data		132.49	139.00	NDR	153.84	NDR	NDR	NDR	NDR	149.84	157.03
Latency	<250ms	100.00	100.00	NDR	100.00	NDR	NDR	NDR	NDR	100.00	100.00

All Operators met the TRAI benchmark.

10.1.4.2 Data Drive Test Results - SAGAR SSA 3G

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA
Succesful Data Transmission download speed attempts	>80%	NDR	NDR	100.00%	NDR
Succesful Data Transmission upload speed attempts	>75%	NDR	NDR	100.00%	NDR
Minimum download speed		NDR	NDR	1146.91	NDR
Average throughput for Packet Data		NDR	NDR	1818.62	NDR
Latency	<250ms	NDR	NDR	100.00	NDR

All Operators met the TRAI benchmark.

10.1.5 BILASPUR SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	Bilaspur	14-03-2016	19-04-2016	565

10.1.5.1 Route Map - BILASPUR DAY 1

Route Covered-day 1

Route Detail:

1) **Bilaspur**

Within City - (Railway station,jagmal chauk,Mopka,Rajkishor nagar,Gitanjali,sarkanda,Old sarkanda, neharu chauk,sadar,Mangala chauk , Maharana chauk, Minocha colony

Major road – (Railway station, CMD chauk, Agrasen chauk,Magarpara,nehru chauk, Mangala chauk, Maharana chauk)

Highway - (Mangala chauk,vyapar vihar road,Railway station,Rajkishor Nagar, Gitanjali city,sarkanda, ware house road)

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10.1.5.2 Route Map - BILASPUR DAY 2

Route Covered-day 2

Route Detail:

1) **Janjgir**

Within City - (Bus Stand,Block colony,chandani para,block colon,sankar nagar,Railway satation)
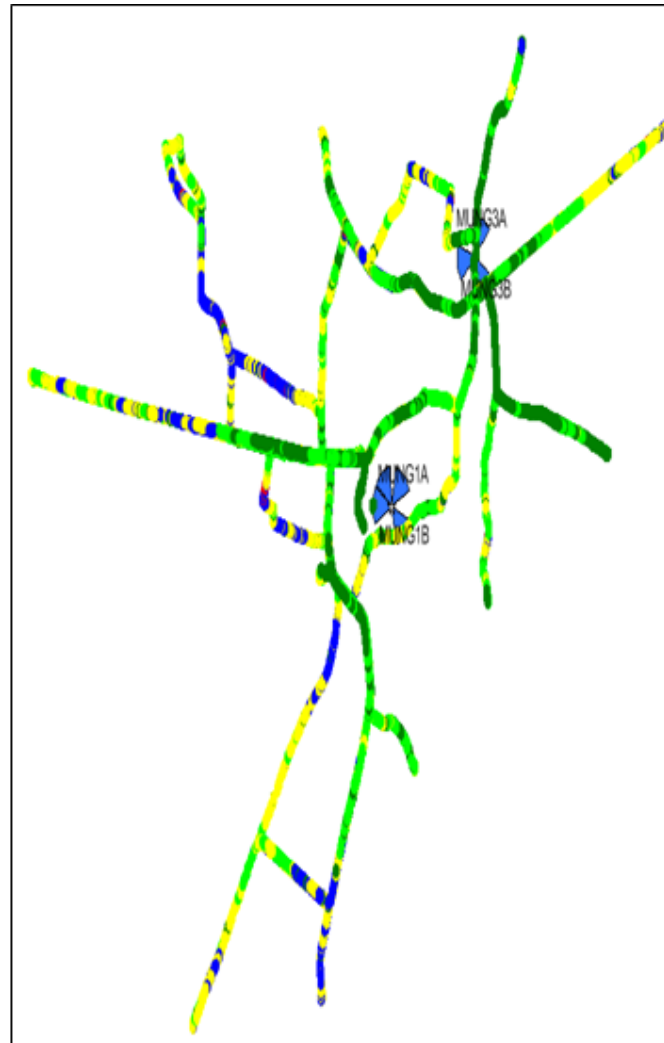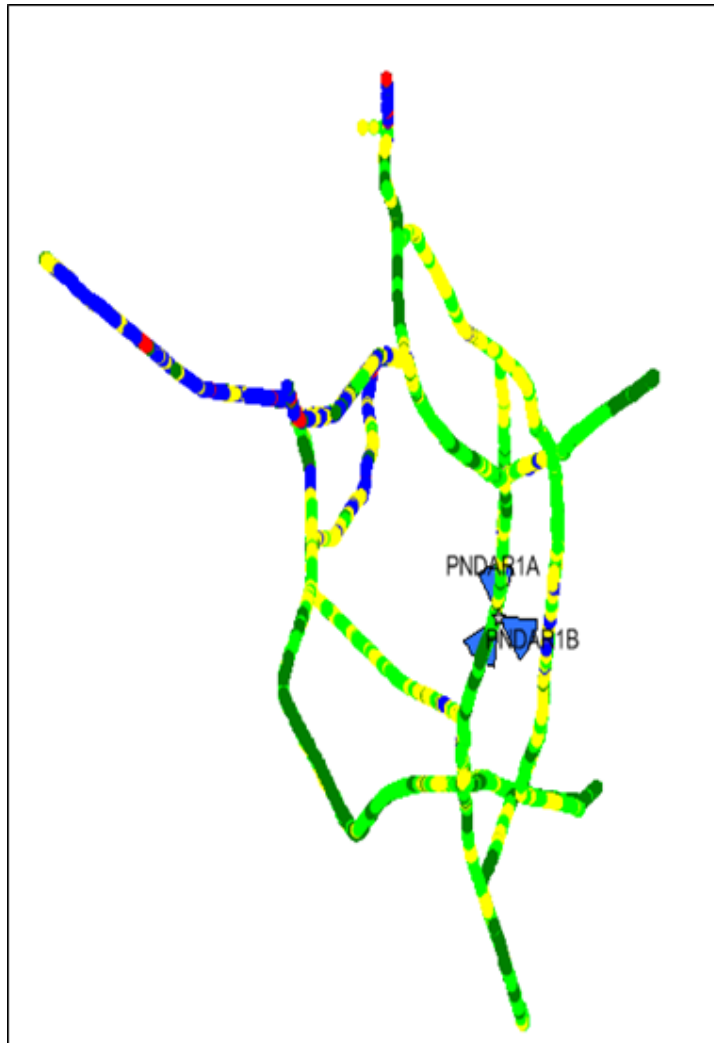
Highway - (Railway station,chandni para,bhata para)

Major Road – (Bus statnd,irigation colony,chandnipara,bhata para)

2) **Sakti**

Within City – **(**Bus stand, Main market, Railway station,Harethi)

Major Road – champa road, railway station,raigarh road.

10.1.5.3 Route Map - BILASPUR DAY 3

Route Covered-day 3

Route Detail:

1)   Pandariya

Major road- SH-10,SH-5,Pandhi road,pondi road

Highway – bus statnd,mungeli road,SH-10,SH-5

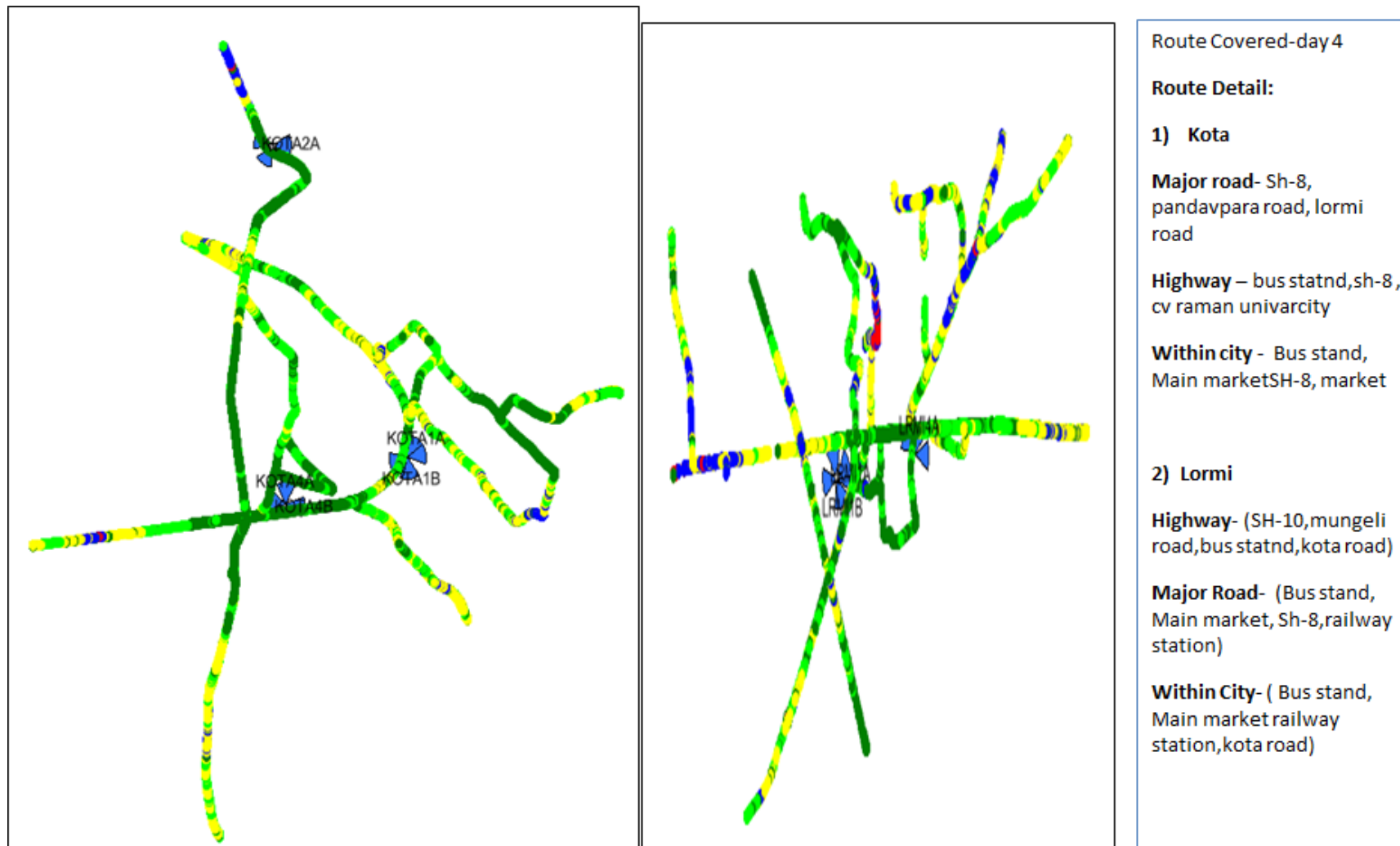**Within city** - Bus stand, Main market, SH-10,SH-5

2) Mungeli

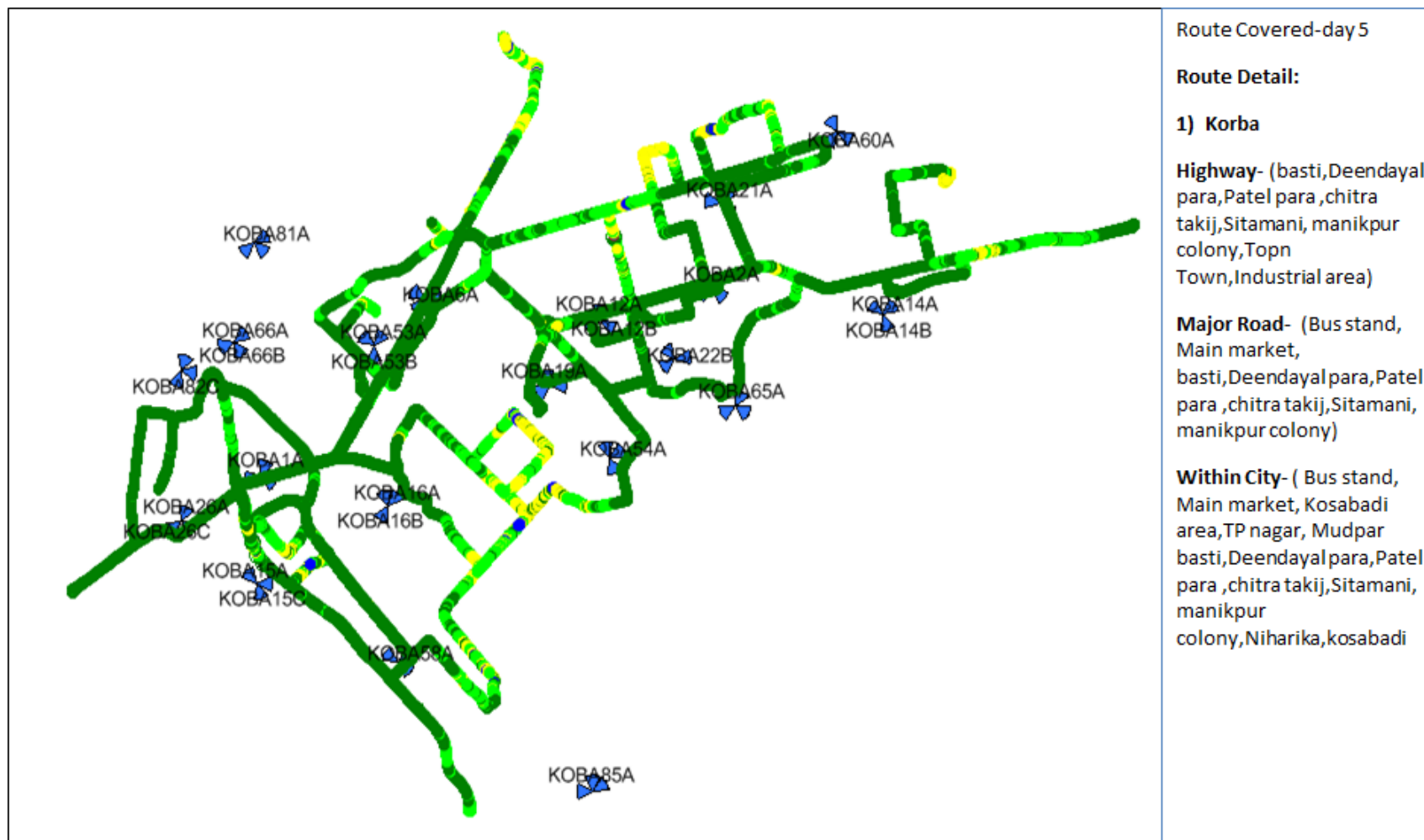**Highway-** (shivpur road,lpandariya road,bus stand)

Major Road- (Bus stand, Main market, Sh-10,karhi road,shivpur road)

Within City- (Bus stand, Main market, shivpur road, main market,daupara,collectrat, mishan chauk,padav chauk

10.1.5.1 Route Map - BILASPUR DAY 4

Route Covered-day 4

Route Detail:

1) **Kota**

Major road- Sh-8, pandavpara road, lormi road

Highway – bus statnd,sh-8 , cv raman univarcity

Within city - Bus stand, Main marketSH-8, market

2) **Lormi**

Highway- (SH-10,mungeli road,bus statnd,kota road)

Major Road- (Bus stand, Main market, Sh-8,railway station)

Within City- (Bus stand, Main market railway station,kota road)

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10.1.5.2 Route Map - BILASPUR DAY 5

Route Covered-day 5

Route Detail:

1) Korba

Highway- (basti,Deendayal para,Patel para ,chitra takij,Sitamani, manikpur colony,Topn Town,Industrial area)

Major Road- (Bus stand, Main market, basti,Deendayal para,Patel para ,chitra takij,Sitamani, manikpur colony)

Within City- (Bus stand, Main market, Kosabadi area,TP nagar, Mudpar basti,Deendayal para,Patel para ,chitra takij,Sitamani, manikpur colony,Niharika,kosabadi

10.1.5.3 Route Map - BILASPUR DAY 6

Route Covered-day 6

Route Detail:

1) Pendra

Major road- SH-8, Sh-4., Bus stand,new bus-stand,vidhyanagar)

Highway – Sh-8,SH-4,Bus stand, bilaspur road

Within city - Bus stand, Main market, Gaurella road,bilaspur road, vidyanagar

10.1.5.4 Drive Test Results - BILASPUR SSA 2G

Bilaspur	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		98.61%	86.97%	81.63%	68.04%	63.8%	73.73%	93.74%	76.03%	84.72%	47.80%	72.09%	53.30%	93.65%	82.20%	89.98%	87.73%	93.33%	89.36%	98.72%	87.10%
0 to -85 dBm		99.99%	96.44%	97.02%	89.72%	94.90%	92.39%	99.74%	93.59%	99.93%	83.42%	98.10%	87.44%	99.98%	99.41%	98.58%	96.74%	99.19%	97.01%	99.99%	98.68%
0 to -95 dBm		100.00%	99.72%	100.00%	97.86%	99.99%	98.21%	99.93%	99.30%	100.00%	99.12%	100.00%	97.95%	100.00%	100.00%	99.94%	99.62%	99.96%	99.47%	100.00%	99.94%
Voice quality	≥ 95%	99.42%	99.02%	97.83%	97.57%	98.68%	97.91%	98.57%	96.30%	99.01%	95.35%	98.55%	93.32%	99.85%	99.26%	99.93%	98.69%	99.87%	98.87%	99.24%	98.50%
CSSR	≥ 95%	100.00%	99.08%	100.00%	99.90%	99.19%	95.53%	100.00%	99.54%	99.26%	98.01%	99.19%	96.75%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.92%	0.00%	0.10%	0.00%	1.39%	0.00%	0.46%	0.74%	1.99%	0.81%	3.25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.10%	0.00%	1.97%	0.00%	0.12%	0.74%	1.83%	0.82%	1.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	98.53%	94.77%	100.00%	99.54%	100.00%	100.00%	100.00%	99.60%	100.00%	99.90%	100.00%	100.00%	100.00%	99.84%	100.00%	100.00%

Voice Quality

Reliance GSM failed to meet the benchmark in outdoor locations in Bilaspur SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Bilaspur SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Bilaspur SSA

10.1.5.5 Drive Test Results - BILASPUR SSA 3G

March	B'mark	Airtel		BSNL		Idea		Tata 3G	
Bilaspur		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.98%	88.74%	26.23%	44.48%	99.79%	79.67%	99.91%	99.96%
0 to -85 dBm		100.00%	97.99%	74.40%	71.33%	100.00%	95.93%	100.00%	100.00%
0 to -95 dBm		100.00%	99.88%	100.00%	92.76%	100.00%	99.79%	100.00%	100.00%
Voice quality	≥ 95%	100.00%	98.11%	99.93%	97.34%	99.00%	97.81%	100.00%	99.09%
CSSR	≥ 95%	100.00%	99.86%	100.00%	95.77%	100.00%	99.10%	100.00%	99.85%
%age Blocked calls		0.00%	0.14%	0.00%	1.15%	0.00%	0.90%	0.00%	0.15%
Call drop rate	≤ 2%	0.00%	0.14%	0.00%	2.29%	0.00%	0.11%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	95.80%	NA	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations in Bilaspur SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Bilaspur SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Bilaspur SSA

10.1.5.1 Data Drive Test Results - BILASPUR SSA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100.00%	100.00%	NDR	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%
Succesful Data Transmission upload speed attempts	>75%	100.00%	100.00%	NDR	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%
Minimum download speed		99.17	101.61	NDR	107.48	93.83	96.06	NDR	NDR	43.58	114.25
Average throughput for Packet Data		119.80	121.27	NDR	148.81	112.92	127.29	NDR	NDR	185.94	146.04
Latency	<250ms	100.00	100.00	NDR	100.00	100.00	100.00	NDR	NDR	100.00	100.00

All operators met the TRAI benchmark

10.1.5.2 Data Drive Test Results - BILASPUR SSA 3G

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA
Succesful Data Transmission download speed attempts	>80%	100.00%	NDR	100.00%	NDR
Succesful Data Transmission upload speed attempts	>75%	100.00%	NDR	100.00%	NDR
Minimum download speed		1418.03	NDR	1690.28	NDR
Average throughput for Packet Data		1934.44	NDR	2579.16	NDR
Latency	<250ms	100.00	NDR	100.00	NDR

All operators met the TRAI benchmark

10.1.6 DURG SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	Durg	28-03-2016	02-04-2016	530

10.1.6.1 Route Map - DURG DAY 1
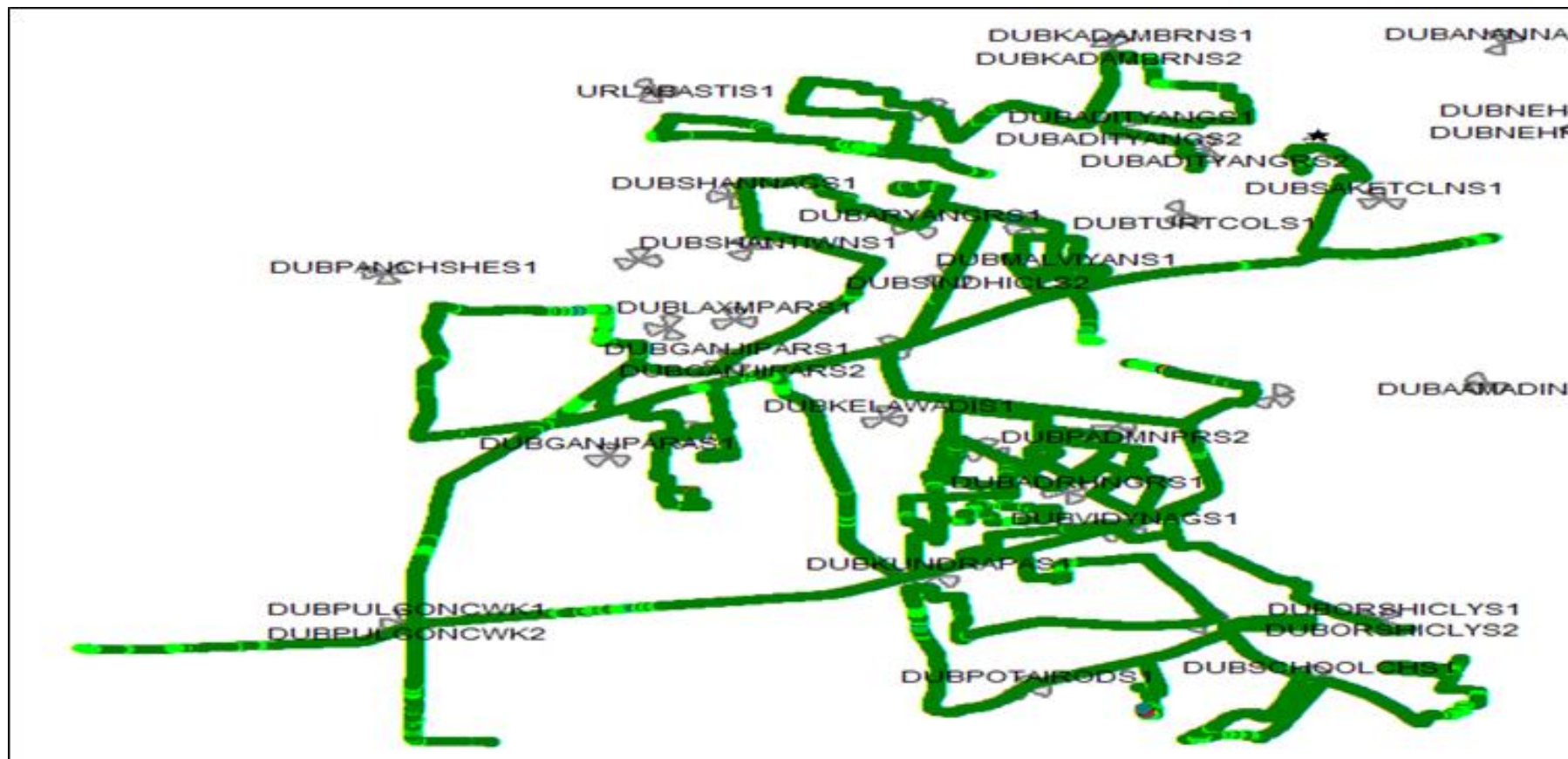
10.1.6.2 Route Map - DURG DAY 2
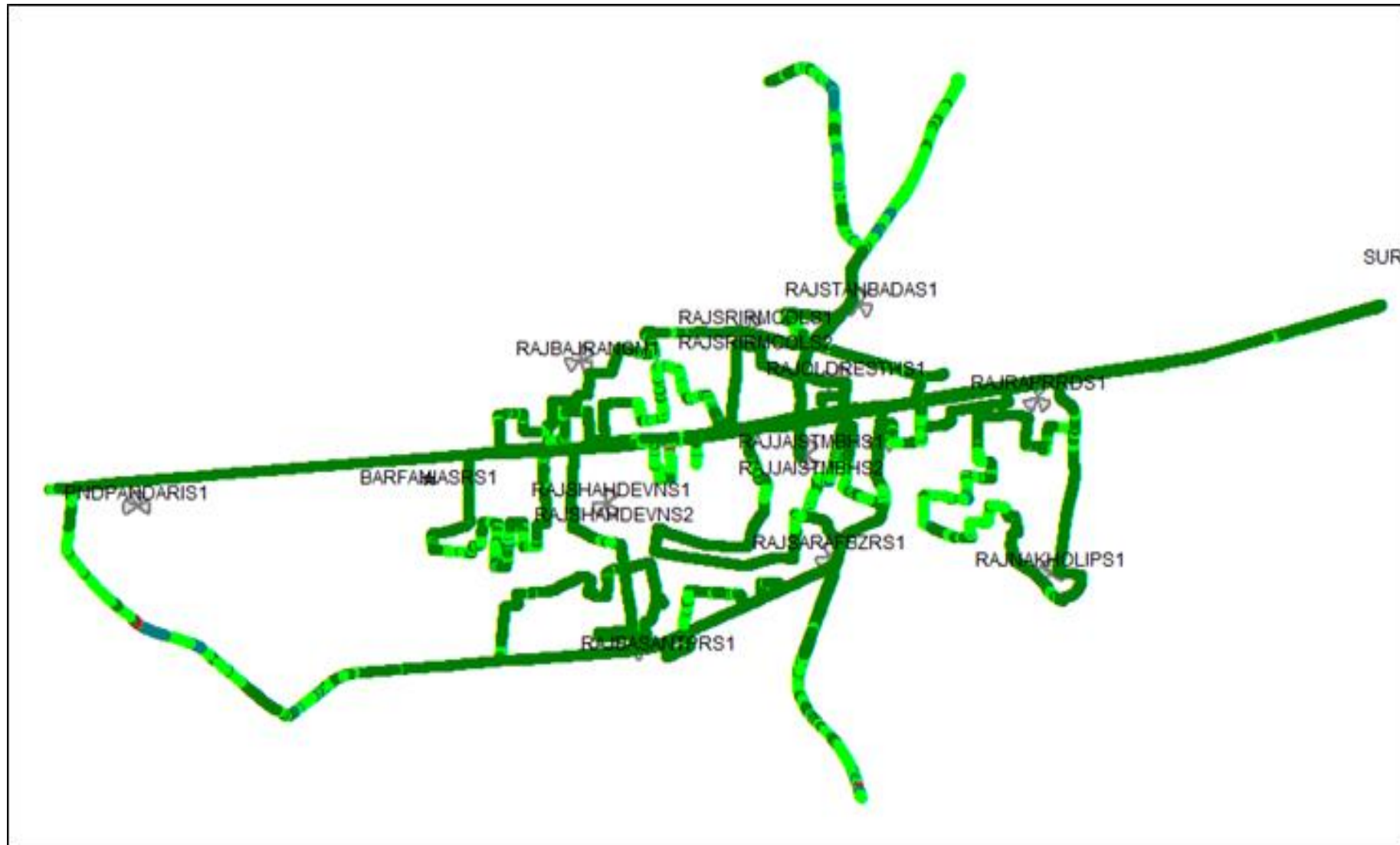
10.1.6.3 Route Map - DURG DAY 3

10.1.6.4 Route Map - DURG DAY 4

10.1.6.5 Route Map - DURG DAY 5

10.1.6.6 Route Map - DURG DAY 6

10.1.6.7 Drive Test Results - DURG SSA 2G

Durg	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		94.84%	85.57%	97.56%	81.71%	64.27%	65.69%	94.04%	83.15%	86.90%	59.40%	62.81%	52.06%	60.88%	37.55%	88.47%	84.48%	95.47%	82.19%	98.97%	86.64%
0 to -85 dBm		99.97%	95.31%	99.90%	95.81%	97.48%	91.29%	99.99%	97.13%	97.86%	88.27%	99.28%	87.90%	99.86%	80.61%	98.94%	95.01%	99.98%	94.75%	99.99%	98.48%
0 to -95 dBm		100.00%	98.85%	99.99%	99.32%	99.99%	95.28%	100.00%	99.77%	100.00%	98.65%	99.96%	97.79%	100.00%	98.02%	99.99%	99.04%	99.99%	98.53%	100.00%	99.91%
Voice quality	≥ 95%	99.49%	98.94%	97.91%	97.18%	99.03%	98.33%	98.83%	96.50%	99.60%	98.16%	99.00%	95.19%	99.84%	99.73%	99.58%	98.39%	99.48%	99.16%	99.04%	98.57%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	97.59%	100.00%	99.18%	100.00%	99.89%	100.00%	98.61%	100.00%	100.00%	100.00%	100.00%	100.00%	99.87%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	1.67%	1.51%	0.00%	0.82%	0.00%	0.11%	0.00%	1.39%	0.00%	0.00%	0.00%	0.00%	0.00%	0.13%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.84%	1.30%	0.00%	0.14%	0.00%	0.11%	0.80%	0.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	95.83%	100.00%	99.70%	100.00%	100.00%	100.00%	99.55%	100.00%	99.94%	100.00%	99.90%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations in Durg SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Durg SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Durg SSA

10.1.6.8 Drive Test Results - DURG SSA 3G

March	B'mark	Airtel		BSNL		Idea		Tata 3G	
Durg		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		98.58%	79.15%	19.75%	25.81%	83.68%	62.50%	60.88%	37.55%
0 to -85 dBm		100.00%	92.63%	87.29%	57.14%	99.82%	94.15%	99.86%	80.61%
0 to -95 dBm		100.00%	99.42%	100.00%	96.32%	100.00%	99.77%	100.00%	98.02%
Voice quality	≥ 95%	100.00%	98.47%	99.98%	97.41%	97.67%	96.31%	99.84%	99.73%
CSSR	≥ 95%	100.00%	100.00%	97.50%	98.00%	100.00%	99.68%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	1.67%	1.50%	0.00%	0.32%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	1.69%	0.97%	0.00%	0.81%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	94.87%	99.15%	100.00%	100.00%	100.00%	99.94%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations in Durg SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Durg SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Durg SSA

10.1.6.1 Data Drive Test Results - DURG SSA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100.00%	NDR	NDR	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%
Succesful Data Transmission upload speed attempts	>75%	100.00%	NDR	NDR	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%
Minimum download speed		57.07	NDR	NDR	93.21	106.05	108.84	NDR	NDR	48.61	141.97
Average throughput for Packet Data		112.47	NDR	NDR	131.41	126.34	128.95	NDR	NDR	186.44	187.29
Latency	<250ms	100.00	NDR	NDR	100.00	100.00	100.00	NDR	NDR	100.00	100.00

All operators met the TRAI benchmark.

10.1.6.2 Data Drive Test Results - DURG SSA 3G

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA
Succesful Data Transmission download speed attempts	>80%	NDR	NDR	100.00%	NDR
Succesful Data Transmission upload speed attempts	>75%	NDR	NDR	100.00%	NDR
Minimum download speed		NDR	NDR	2398.83	NDR
Average throughput for Packet Data		NDR	NDR	3071.41	NDR
Latency	<250ms	NDR	NDR	100.00	NDR

All operators met the TRAI benchmark.

10.1.7 MANDSAUR SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	MANDSAUR	08-03-2016	10-03-2016	315

10.1.7.1 Route Map - MANDSAUR DAY 1
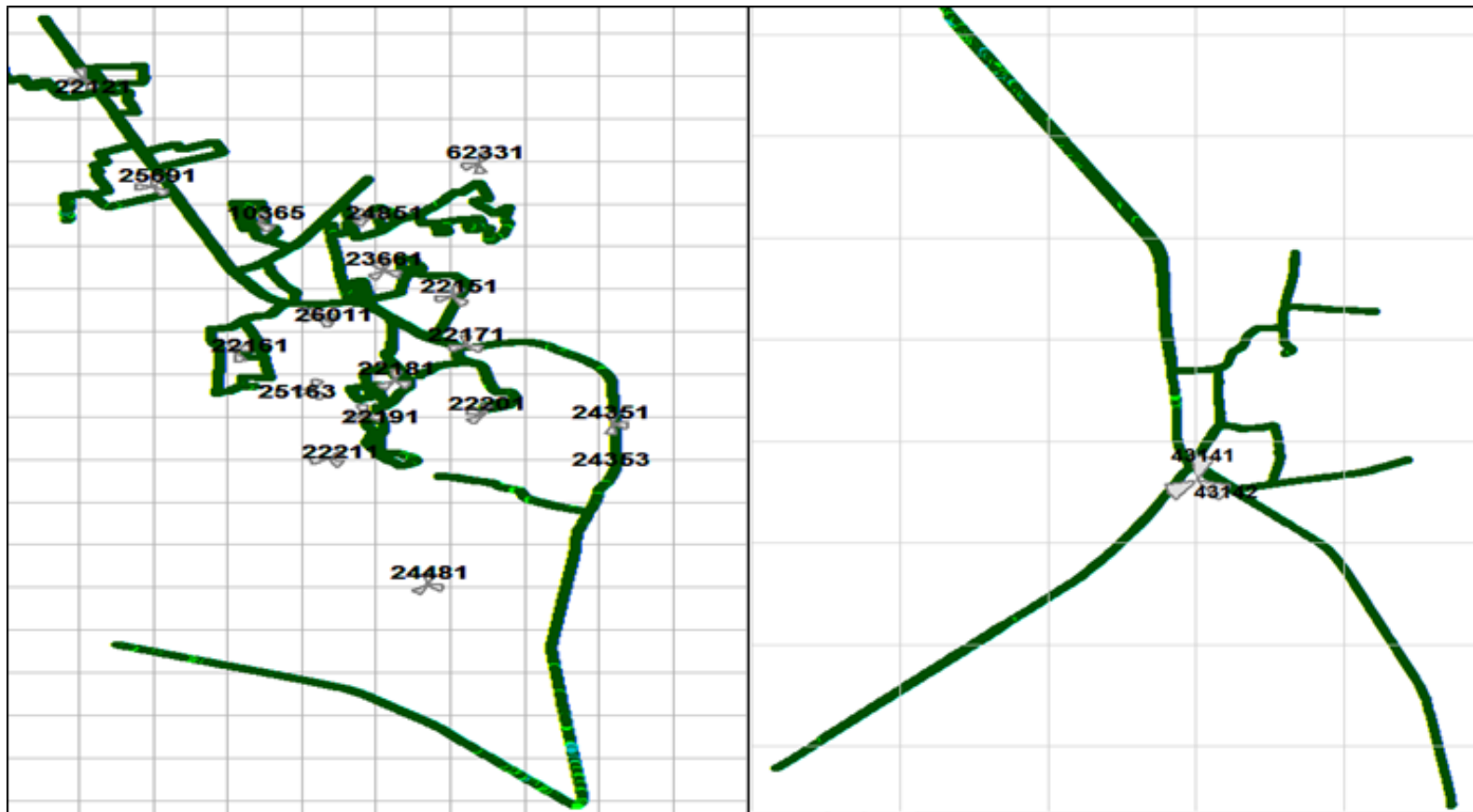
10.1.7.2 Route Map - MANDSAUR DAY 2
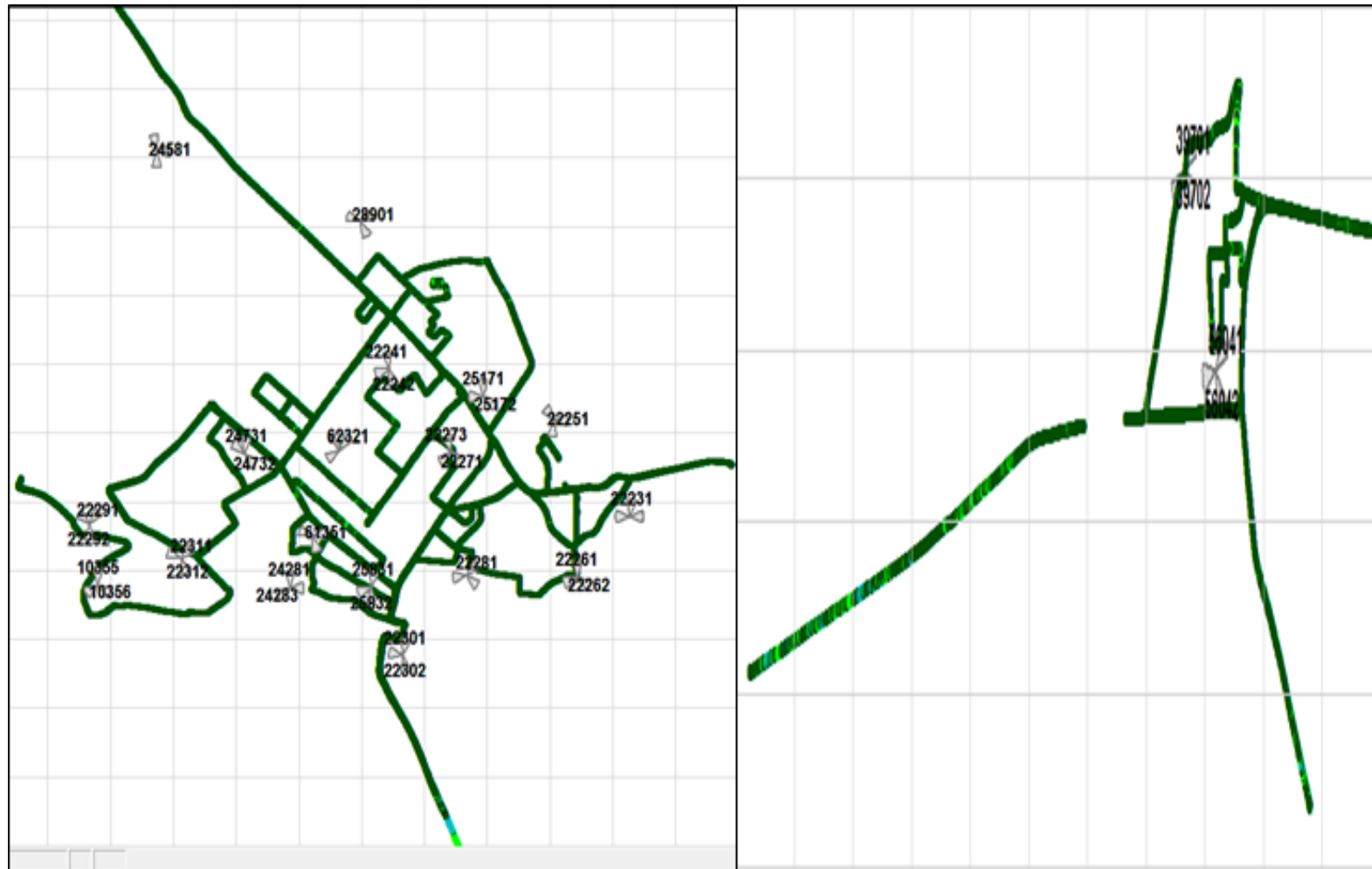
10.1.7.3 Route Map - MANDSAUR DAY 3

10.1.7.4 Drive Test Results - MANDSAUR SSA 2G

Mandsaur SSA	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Coverage		99.65%	75.56%	55.29%	61.46%	99.98%	96.91%	85.46%	57.80%	99.52%	75.58%	100.00%	49.60%	99.74%	85.12%	80.76%	74.65%	100.00%	96.75%
0 to -85 dBm				100.00%	95.80%	91.79%	91.59%	99.99%	99.72%	100.00%	91.00%	100.00%	95.34%	100.00%	93.53%	100.00%	97.85%	99.18%	95.39%	100.00%	99.56%
0 to -95 dBm				100.00%	99.83%	99.84%	99.51%	99.99%	99.97%	100.00%	99.44%	100.00%	99.82%	100.00%	99.84%	100.00%	99.68%	100.00%	99.58%	100.00%	99.98%
Voice quality	≥ 95%			99.26%	97.48%	91.03%	89.64%	98.51%	96.08%	100.00%	98.25%	95.59%	95.10%	100.00%	99.08%	99.05%	97.44%	99.75%	98.66%	99.61%	98.86%
CSSR	≥ 95%			100.00%	100.00%	98.36%	96.28%	100.00%	99.81%	100.00%	100.00%	100.00%	99.09%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	1.64%	3.72%	0.00%	0.19%	0.00%	0.00%	0.00%	0.91%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	1.22%	0.00%	0.00%	0.00%	0.00%	0.00%	1.84%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	99.56%	100.00%	99.47%	100.00%	100.00%	100.00%	99.03%	100.00%	99.62%	83.33%	99.43%	#DIV/0!	100.00%	100.00%	100.00%

Voice Quality

BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations in Mandsaur SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Mandsaur SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Mandsaur SSA

10.1.7.5 Drive Test Results - MANDSAUR SSA 3G

March	B'mark	Airtel		BSNL		Idea		Tata 3G	
Mandsaur		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		100.00%	88.14%	42.10%	11.61%	100.00%	98.56%	2.72%	32.88%
0 to -85 dBm		100.00%	97.27%	90.32%	31.25%	100.00%	99.82%	85.00%	66.83%
0 to -95 dBm		100.00%	99.63%	100.00%	61.63%	100.00%	99.91%	99.95%	91.24%
Voice quality	≥ 95%	99.90%	99.43%	99.98%	97.11%	99.86%	95.85%	99.91%	98.29%
CSSR	≥ 95%	100.00%	100.00%	93.22%	97.70%	100.00%	100.00%	100.00%	99.63%
%age Blocked calls		0.00%	0.00%	0.00%	2.30%	0.00%	0.00%	0.00%	0.37%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	3.03%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations in Mandsaur SSA.

Call Set Success Rate (CSSR)

BSNL 3G failed to meet the benchmark in indoor locations in Mandsaur SSA.

Call Drop Rate

BSNL 3G failed to meet the benchmark in outdoor locations in Mandsaur SSA

Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)

10.1.7.1 Data Drive Test Results - MANDSAUR SSA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	NDR	100.00%	100.00%	100.00%	NDR	NDR	NDR	NDR	100.00%	100.00%
Succesful Data Transmission upload speed attempts	>75%	NDR	100.00%	100.00%	100.00%	NDR	NDR	NDR	NDR	100.00%	100.00%
Minimum download speed		NDR	101.68	47.80	87.76	NDR	NDR	NDR	NDR	124.39	124.39
Average throughput for Packet Data		NDR	123.67	93.20	136.48	NDR	NDR	NDR	NDR	180.44	180.44
Latency	<250ms	NDR	100.00	NDR	100.00	NDR	NDR	NDR	NDR	100.00	100.00

All operators met the TRAI benchmark

10.1.7.2 Data Drive Test Results - MANDSAUR SSA 3G

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA
Succesful Data Transmission download speed attempts	>80%	100.00%	100.00%	100.00%	NDR
Succesful Data Transmission upload speed attempts	>75%	100.00%	100.00%	100.00%	NDR
Minimum download speed		1338.66	558.00	1028.77	NDR
Average throughput for Packet Data		2562.52	635.86	2160.14	NDR
Latency	<250ms	100.00	NDR	100.00	NDR

All operators met the TRAI benchmark

10.1.8 SHAJAPUR SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	SAJAPUR	02-03-2016	04-03-2016	330

10.1.8.1 Route Map - SHAJAPUR DAY 1

10.1.8.2 Route Map - SHAJAPUR DAY 2

10.1.8.3 Route Map - SHAJAPUR DAY 3

10.1.8.4 Drive Test Results - SHAJAPUR SSA 2G

SAJAPUR	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		98.60%	89.17%	89.57%	77.17%	99.76%	67.20%	99.99%	97.42%	100.00%	53.55%	54.53%	42.70%	13.19%	29.19%	99.55%	88.49%	94.07%	78.23%	99.22%	94.02%
0 to -85 dBm		100.00%	96.80%	99.36%	96.32%	100.00%	90.60%	100.00%	99.66%	100.00%	81.98%	97.77%	81.27%	99.02%	79.59%	99.99%	98.23%	99.89%	95.36%	99.99%	98.83%
0 to -95 dBm		100.00%	99.49%	100.00%	99.75%	100.00%	98.83%	100.00%	99.97%	100.00%	97.54%	100.00%	99.09%	100.00%	97.85%	100.00%	99.78%	100.00%	99.60%	100.00%	99.93%
Voice quality	≥ 95%	99.34%	98.00%	99.26%	98.19%	92.09%	94.44%	98.88%	97.55%	100.00%	98.40%	95.75%	95.22%	99.52%	99.05%	98.53%	97.30%	98.58%	97.84%	99.50%	99.16%
CSSR	≥ 95%	100.00%	96.43%	100.00%	100.00%	98.36%	97.54%	100.00%	100.00%	100.00%	100.00%	100.00%	99.77%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	96.18%
%age Blocked calls		0.00%	3.57%	0.00%	0.00%	1.64%	2.46%	0.00%	0.00%	0.00%	0.00%	0.00%	0.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.69%	0.00%	0.23%	0.00%	0.00%	0.00%	0.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	96.96%	100.00%	99.61%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.87%	100.00%	100.00%	100.00%	100.00%

Voice Quality

BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations in Sajapur SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Sajapur SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Sajapur SSA

10.1.8.5 Drive Test Results - SHAJAPUR SSA 3G

March Shajapur	B'mark	Airtel In door	Airtel Outdoor	BSNL In door	BSNL Outdoor	Idea In door	Idea Outdoor	Tata 3G In door	Tata 3G Outdoor
0 to -75 dBm		99.26%	81.70%	4.48%	10.45%	100.00%	96.73%	2.51%	22.98%
0 to -85 dBm		100.00%	96.53%	87.48%	37.06%	100.00%	99.14%	86.37%	52.52%
0 to -95 dBm		100.00%	99.81%	100.00%	75.28%	100.00%	99.98%	100.00%	85.79%
Voice quality	≥ 95%	99.39%	99.37%	99.97%	99.50%	99.88%	98.42%	99.87%	99.34%
CSSR	≥ 95%	100.00%	100.00%	98.33%	98.47%	100.00%	99.75%	100.00%	99.33%
%age Blocked calls		0.00%	0.00%	1.67%	1.53%	0.00%	0.25%	0.00%	0.67%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	2.33%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations in Sajapur SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Sajapur SSA.

Call Drop Rate

BSNL 3G failed to meet the benchmark in outdoor locations in Sajapur SSA

10.1.8.1 Data Drive Test Results - SHAJAPUR SSA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100.00%	100.00%	100.00%	100.00%	NDR	NDR	NDR	NDR	100.00%	100.00%
Succesful Data Transmission upload speed attempts	>75%	100.00%	100.00%	100.00%	100.00%	NDR	NDR	NDR	NDR	100.00%	100.00%
Minimum download speed		53.94	101.82	38.51	104.31	NDR	NDR	NDR	NDR	63.83	144.25
Average throughput for Packet Data		107.32	120.83	62.00	153.15	NDR	NDR	NDR	NDR	148.01	192.57
Latency	<250ms	100.00	100.00	NDR	100.00	NDR	NDR	NDR	NDR	100.00	100.00

All operators met the TRAI benchmark.

10.1.8.2 Data Drive Test Results - SHAJAPUR SSA 3G

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA
Succesful Data Transmission download speed attempts	>80%	100.00%	100.00%	100.00%	NDR
Succesful Data Transmission upload speed attempts	>75%	100.00%	100.00%	100.00%	NDR
Minimum download speed		1407.11	558.00	1184.09	NDR
Average throughput for Packet Data		2632.84	635.86	1948.07	NDR
Latency	<250ms	100.00	NDR	100.00	NDR

10.1.9 BALAGHAT SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	Betul	18-02-2016	20-02-2016	311

10.1.9.1 Route Map - BALAGHAT DAY 1
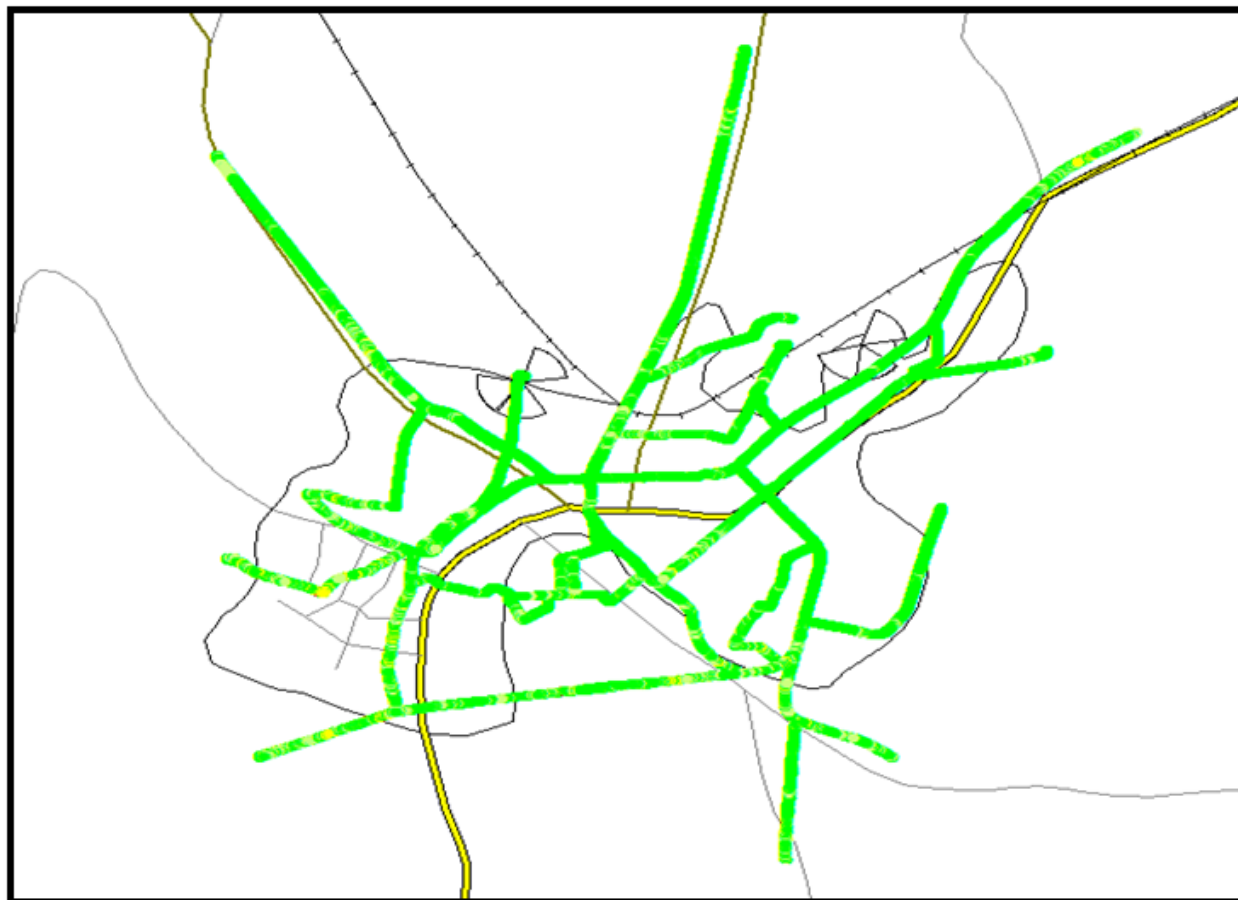
Waraseoni Route Covered- Day 1

1. Jai Stambh Chowk

2. Police Station Waraseoni

3. Shvdham Mohalla

4. MPEB Colony

5. Katangi Road

6. Shankar Nagar

7. Aadharsh Nagar

8. Rampaili Road

9.

10.

11.

12.

10.1.9.2 Route Map - BALAGHAT DAY 2

10.1.9.1 Route Map - BALAGHAT DAY 3

10.1.9.2 Drive Test Results - BALAGHAT SSA 2G

Balaghat	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		97.78%	85.70%	82.41%	64.19%	38.99%	20.53%	61.48%	37.92%	92.78%	49.90%	80.21%	55.92%	47.93%	52.12%	98.30%	86.82%	99.33%	72.49%	97.23%	68.89%
0 to -85 dBm		99.97%	97.79%	96.52%	87.87%	97.01%	78.45%	99.55%	85.66%	100.00%	81.04%	99.11%	86.09%	99.31%	87.21%	100.00%	96.74%	100.00%	93.62%	99.99%	94.13%
0 to -95 dBm		100.00%	99.98%	99.96%	97.96%	100.00%	97.25%	99.94%	99.42%	100.00%	98.63%	100.00%	98.72%	100.00%	99.74%	100.00%	99.79%	100.00%	99.76%	100.00%	99.65%
Voice quality	≥ 95%	99.52%	99.44%	98.96%	98.68%	96.11%	97.21%	99.45%	98.74%	98.39%	97.20%	98.47%	97.01%	99.85%	98.28%	99.09%	98.82%	99.97%	98.69%	99.10%	98.45%
CSSR	≥ 95%	100.00%	100.00%	100.00%	99.83%	100.00%	97.47%	100.00%	100.00%	100.00%	99.77%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.79%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.17%	0.00%	2.06%	0.00%	0.00%	0.00%	0.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	2.79%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	97.13%	100.00%	99.89%	100.00%	100.00%	100.00%	98.67%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations in Balaghat SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Balaghat SSA.

Call Drop Rate

BSNL 3G failed to meet the benchmark in outdoor locations in Balaghat SSA

10.1.9.3 Drive Test Results - BALAGHAT SSA 3G

February Balaghat	B'mark	Airtel		BSNL		Idea		Tata 3G	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.92%	62.80%	NDR		95.17%	43.98%	98.82%	94.26%
0 to -85 dBm		100.00%	86.34%			100.00%	96.78%	100.00%	96.82%
0 to -95 dBm		100.00%	97.93%			100.00%	99.97%	100.00%	99.28%
Voice quality	≥ 95%	99.30%	99.58%			99.92%	96.35%	100.00%	99.52%
CSSR	≥ 95%	100.00%	100.00%			100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%			0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%			0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%			100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations in Balaghat SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Balaghat SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Balaghat SSA

10.1.9.1 Data Drive Test Results - BALAGHAT SSA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100.00%	NDR	96.66%	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%
Succesful Data Transmission upload speed attempts	>75%	100.00%	NDR	96.66%	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%
Minimum download speed		150.86	NDR	85.66	67.32	88.77	86.99	NDR	NDR	36.58	124.53
Average throughput for Packet Data		155.87	NDR	194.37	121.00	129.48	151.35	NDR	NDR	175.23	192.66
Latency	<250ms	100.00	NDR	100.00	100.00	100.00	100.00	NDR	NDR	100.00	100.00

All operators met the TRAI benchmark.

10.1.9.2 Data Drive Test Results - BALAGHAT SSA 3G

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA
Succesful Data Transmission download speed attempts	>80%	NDR	NDR	100.00%	NDR
Succesful Data Transmission upload speed attempts	>75%	NDR	NDR	100.00%	NDR
Minimum download speed		NDR	NDR	2807.07	NDR
Average throughput for Packet Data		NDR	NDR	3656.00	NDR
Latency	<250ms	NDR	NDR	100.00	NDR

All operators met the TRAI benchmark.

10.1.10 BETUL SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	Betul	24-02-2016	26-02-2016	311

10.1.10.1 Route Map - BETUL DAY 1

10.1.10.2 Route Map - BETUL DAY 2
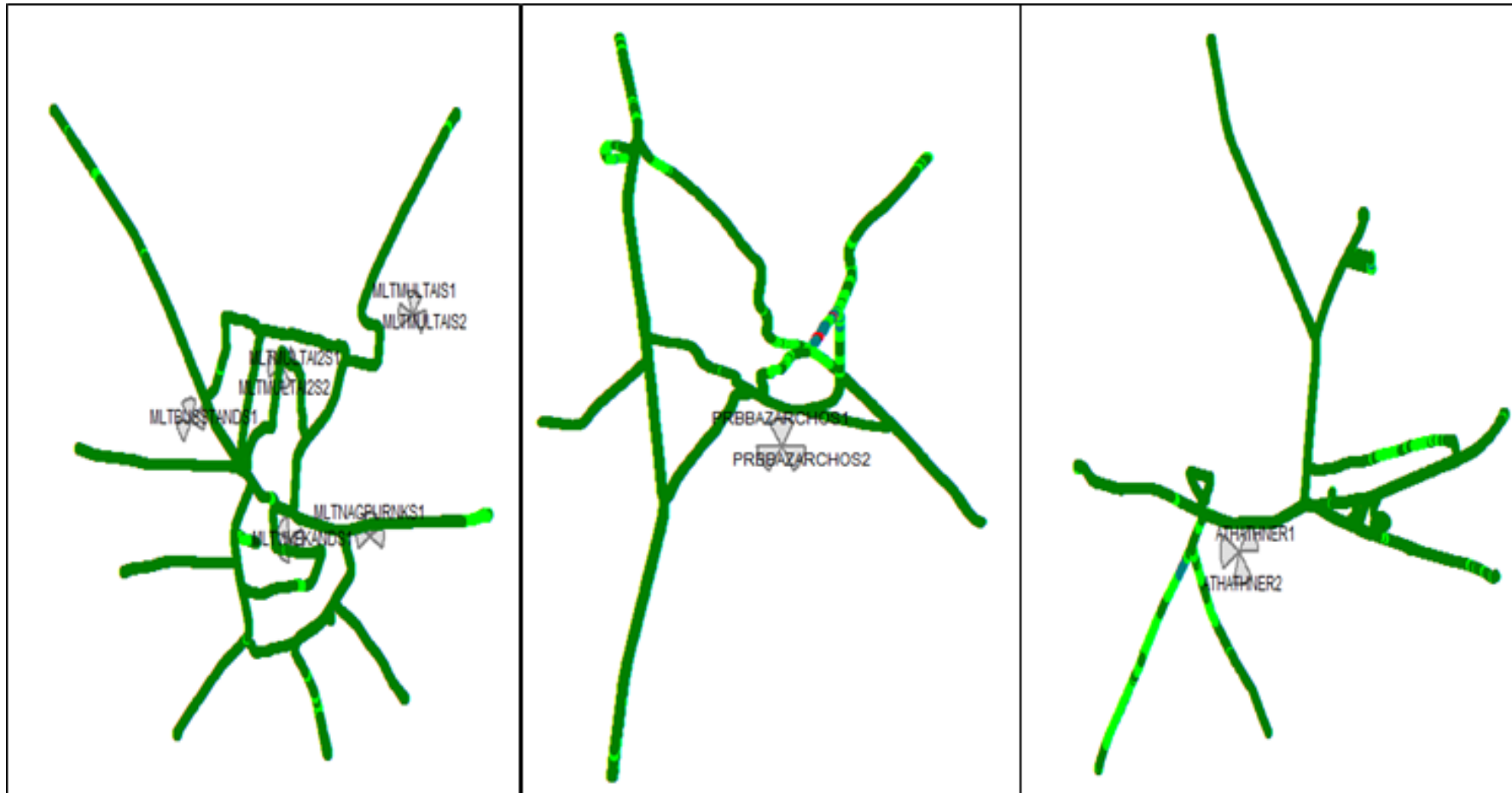
10.1.10.3 Route Map - BETUL DAY 3

10.1.10.4 Drive Test Results – BETUL SSA 2G

BETUL	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Coverage		98.79%	78.46%	100.00%	100.00%	78.33%	87.66%	87.05%	65.24%	96.77%	78.78%	100.00%	40.50%	87.64%	66.46%	95.50%	91.93%	97.71%	89.34%
0 to -85 dBm				100.00%	95.43%	100.00%	100.00%	99.36%	99.37%	100.00%	92.44%	100.00%	98.10%	100.00%	73.65%	99.32%	91.38%	99.75%	98.32%	100.00%	99.10%
0 to -95 dBm				100.00%	99.81%	100.00%	100.00%	99.99%	100.00%	100.00%	99.92%	100.00%	99.97%	100.00%	94.72%	99.86%	99.02%	99.95%	99.87%	100.00%	99.96%
Voice quality	≥ 95%			99.18%	98.71%	100.00%	100.00%	98.54%	95.58%	99.80%	98.36%	94.25%	95.22%	100.00%	100.00%	98.84%	98.80%	99.41%	98.70%	99.04%	98.43%
CSSR	≥ 95%			100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.52%	100.00%	100.00%	100.00%	99.54%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.48%	0.00%	0.00%	0.00%	0.40%	0.00%	0.47%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	0.00%	0.00%	0.21%	0.00%	0.00%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	100.00%	100.00%	99.63%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.61%	100.00%	99.81%	100.00%	100.00%

Voice Quality

Reliance GSM failed to meet the benchmark in outdoor locations in Betul SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Betul SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Betul SSA

10.1.10.5 Drive Test Results - BETUL SSA 3G

February	B'mark	Airtel		BSNL		Idea		Tata 3G	
BETUL		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		100.00%	75.65%	33.99%	15.58%	68.95%	75.28%	100.00%	64.42%
0 to -85 dBm		100.00%	91.76%	63.06%	41.62%	97.93%	96.85%	100.00%	89.88%
0 to -95 dBm		100.00%	99.19%	94.85%	74.77%	100.00%	99.95%	100.00%	98.98%
Voice quality	≥ 95%	100.00%	99.79%	92.77%	81.93%	99.89%	98.89%	100.00%	98.44%
CSSR	≥ 95%	100.00%	100.00%	98.51%	92.92%	100.00%	99.64%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	1.49%	7.08%	0.00%	0.36%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	95.56%	100.00%	100.00%	100.00%	100.00%

Voice Quality

BSNL 3G failed to meet the benchmark in outdoor as well as indoor locations in Betul SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Betul SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Betul SSA

10.1.10.1 Data Drive Test Results - BETUL SSA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	NDR	100.00%	100.00%	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%
Succesful Data Transmission upload speed attempts	>75%	NDR	100.00%	100.00%	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%
Minimum download speed		NDR	102.43	22.98	101.51	82.78	74.05	NDR	NDR	62.55	82.48
Average throughput for Packet Data		NDR	126.35	21.69	147.63	126.92	122.40	NDR	NDR	141.67	190.77
Latency	<250ms	NDR	100.00	NDR	100.00	100.00	100.00	NDR	NDR	100.00	100.00

All operators met the TRAI benchmark

10.1.10.2 Data Drive Test Results - BETUL SSA 3G

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA
Succesful Data Transmission download speed attempts	>80%	100.00%	100.00%	100.00%	NDR
Succesful Data Transmission upload speed attempts	>75%	100.00%	100.00%	100.00%	NDR
Minimum download speed		1406.82	67.34	1932.15	NDR
Average throughput for Packet Data		2382.77	67.89	2472.57	NDR
Latency	<250ms	100.00	100.00	100.00	NDR

All operators met the TRAI benchmark.

10.1.11   MANDLA SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	Mandla	15-02-2016	17-02-2016	311

10.1.11.1 Route Map - MANDLA DAY 1

Nainpur Route Covered-
Day 1

1. Irrigation Colony

2. Khermai Road

3. Busstand

4. Mandla Road

5. Railway Colony

6. Nainpur Market

7.

8.

9.

10.

11.

12.

Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)
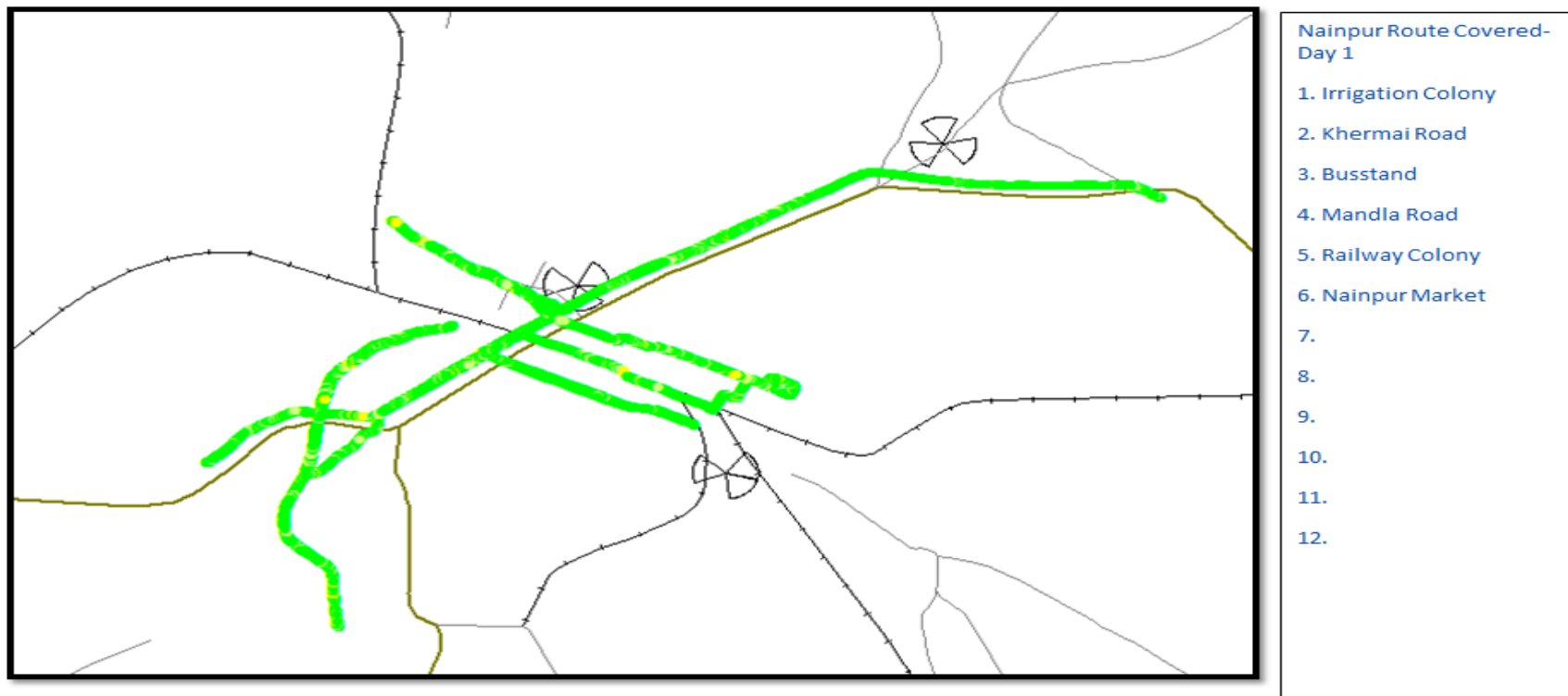
10.1.11.2 Route Map - MANDLA DAY 2

10.1.11.3 Route Map - MANDLA DAY 3
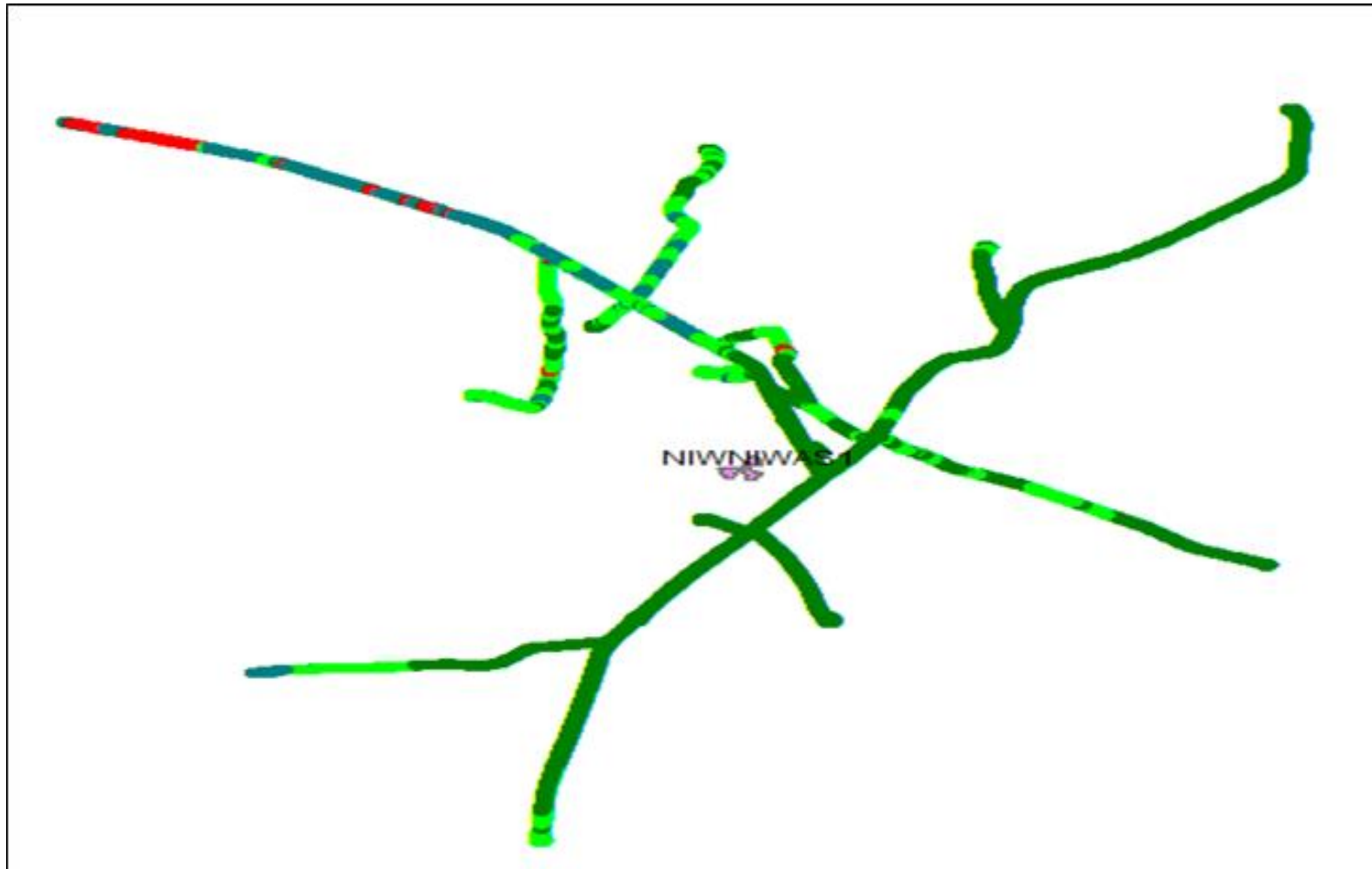
10.1.11.4 Drive Test Results - MANDLA SSA 2G

MANDLA	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		97.16%	87.00%	100.00%	86.02%	NDR		60.15%	72.09%	95.77%	54.76%	98.16%	70.31%	100.00%	51.71%	99.83%	83.82%	97.64%	73.33%	63.91%	78.87%
0 to -85 dBm		99.80%	97.77%	100.00%	97.65%			96.67%	95.32%	99.78%	83.76%	100.00%	92.26%	100.00%	81.37%	100.00%	98.28%	99.98%	94.66%	95.44%	95.75%
0 to -95 dBm		100.00%	99.99%	100.00%	99.93%			99.62%	99.74%	100.00%	95.58%	100.00%	98.47%	100.00%	98.79%	100.00%	99.86%	100.00%	99.62%	99.83%	99.49%
Voice quality	≥ 95%	98.79%	98.59%	98.98%	97.61%			98.69%	96.24%	98.66%	97.56%	98.74%	95.55%	99.98%	99.84%	98.27%	98.16%	99.98%	97.99%	99.36%	98.87%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%			100.00%	99.42%	100.00%	100.00%	100.00%	99.53%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%			0.00%	0.58%	0.00%	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%			0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%			100.00%	99.91%	100.00%	100.00%	100.00%	100.00%	100.00%	99.40%	100.00%	100.00%	100.00%	99.69%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations in Mandla SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Mandla SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Mandla SSA

10.1.11.5 Drive Test Results - MANDLA SSA 3G

February	B'mark	Airtel		BSNL		Idea		Tata 3G	
MANDLA		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NA	83.08%			98.40%	83.72%		
0 to -85 dBm		NA	94.79%			99.99%	97.02%		
0 to -95 dBm		NA	100.00%			100.00%	99.89%		
Voice quality	≥ 95%	NA	99.80%	NDR		99.63%	97.16%	No Coverage	
CSSR	≥ 95%	NA	100.00%			100.00%	98.97%		
%age Blocked calls		NA	0.00%			0.00%	1.03%		
Call drop rate	≤ 2%	NA	0.00%			0.00%	0.00%		
Hands off success rate		NA	100.00%			100.00%	100.00%		

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations in Mandla SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations in Mandla SSA.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations in Mandla n SSA

10.1.11.1 Data Drive Test Results - MANDLA SSA 2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100.00%	NDR	NDR	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%
Succesful Data Transmission upload speed attempts	>75%	100.00%	NDR	NDR	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%
Minimum download speed		137.86	NDR	NDR	96.72	95.45	71.45	NDR	NDR	35.94	110.53
Average throughput for Packet Data		161.33	NDR	NDR	140.38	125.15	122.25	NDR	NDR	172.90	161.28
Latency	<250ms	100.00	NDR	NDR	100.00	100.00	100.00	NDR	NDR	100.00	100.00

All operators met the TRAI benchmark.

10.1.11.2 Data Drive Test Results - MANDLA SSA 3G

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA
Succesful Data Transmission download speed attempts	>80%	NDR	NDR	100.00%	NDR
Succesful Data Transmission upload speed attempts	>75%	NDR	NDR	100.00%	NDR
Minimum download speed		NDR	NDR	1520.06	NDR
Average throughput for Packet Data		NDR	NDR	2115.00	NDR
Latency	<250ms	NDR	NDR	100.00	NDR

All operators met the TRAI benchmark.

10.2 INDEPENDENT DRIVE TEST – VOICE

10.2.1 Indore SSA

Month	Name of SSA Covered	Start Date	End Date	KM Covered
January	Indore	04-01-2016	07-01-2016	320

10.2.1.1 Route Details – Indore SSA

DAY1	DAY2	DAY3
Jawahar marg –Aerodrum Road-Devi Ahilya bai Holkar Airport- district Road-Super corridor Road-Ujjain indoor Road-kila maidan Road-Rambag-South Tukoganj- Pipliyahana Road –Musakhedi Road- Eastern Ring Road-Pipliya Road-LIG Colony- AB Road-Annapurna road-lal bagh road-south toda-Martand chowk-nagar nigam-badvali chowk-dhar road.	Snehlataganj-new devas Road-yeswant niwas Road-Old plasia-Nehru nagar-Amer Tikri pf colony-Ambedkar nagar-CRP Line-Raj Nagar colony-officers colony-MR 10 Rd-MR 9 Rd-Rajiv awas vihar-Vijay Nagar-Aranya Nagar-Shalimar Township-Dewas Naka-Talawali Chanda-magalay sadak-Aeropolis Institute of technology-Manglia-Mubai Agra National Highway-Indor Byepass-Bicholi Mardana-Limbodi-Rani bagh main-sant nagar- khandwa road-manik bagh road-machnic nagar-aditya nagar-Cat Road.	Badi Gwaltoli Rd-E sector-Geeta Nagar-Vandana nagar-Sainath colony-Swami vivekanand nagar-Sanvid nagar-saket nagar-annop nagar-Raj nagar-Vasant vihar colony-Niranjanpur-Pushp vihar colony-Mahalaxmi nagar colony-Sai kirpa colony-apollo db city-Khajrana Road.

10.2.1.1 Route Map - Indore DAY 1, DAY2 AND DAY3
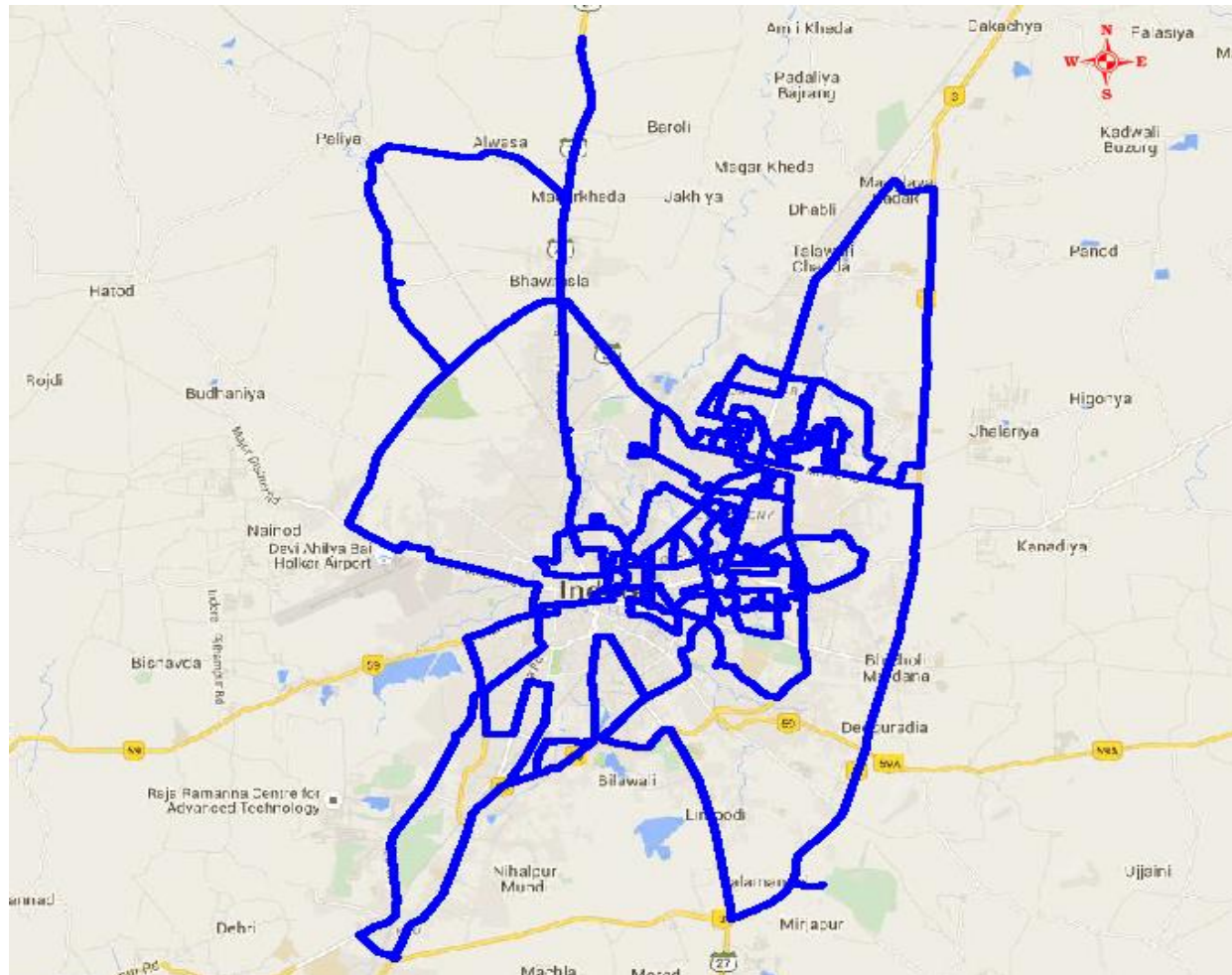
10.2.1.1 Drive Test Results - Indore SSA 2G & 3G

KPI	Airtel GSM	Airtel 3G	BSNL GSM	BSNL 3G	Idea GSM	Idea 3G	Reliance CDMA	Reliance GSM	Reliance 3G	Tata CDMA	Tata GSM	Tata 3G	Videocon GSM	Vodafone GSM
Call Attempt	379	420	401	378	378	376	429	404	398	406	353	372	470	379
Blocked Call rate	5.01%	1.90%	3.49%	5.56%	2.57%	2.39%	1.63%	10.89%	11.56%	0.99%	4.82%	7.53%	7.45%	1.58%
CSSR (>=95%)	94.99%	98.10%	96.51%	94.44%	97.43%	97.61%	98.37%	89.11%	88.44%	99.01%	95.18%	92.47%	92.55%	98.42%
Dropped Call Rate (<=2%)	1.58%	2.62%	2.49%	5.56%	5.40%	3.72%	1.63%	3.22%	5.03%	1.23%	5.10%	2.42%	2.34%	1.85%
Rx Quality (>=95%)	83.78%	87.44%	86.14%	86.43%	95.64%	95.64%	95.64%	95.64%	95.64%	97.10%	90.70%	95.10%	84.87%	92.78%
Handover Success Rate	98.32%	99.09%	94.68%	93.67%	93.30%	95.67%	100.00%	95.40%	94.32%	100.00%	95.64%	97.35%	96.95%	98.74%

Voice Quality

Airtel 2G & 3G, BSNL 2G & 3G, TATA GSM, Videocon 2G and Vodafone 2G failed to meet the benchmark for voice quality in Indore city.

Call Set Success Rate (CSSR)

Airtel 2G, BSNL 3G, Reliance GSM & 3G, Tata 3G and Videocon failed to meet the benchmark for CSSR in Indore city.

Call Drop Rate

Airtel 3G, BSNL 2G & 3G, Idea 2G & 3G, Reliance GSM & 3G, Tata GSM & 3G and Videocon failed to meet the benchmark for call drop rate in Indore city.

11 ANNEXURE – CONSOLIDATED-2G

11.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data										
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		384	29615	11203	31691	5415	12149	1279	11268	5216	17552
Sum of downtime of BTSs in a month (in hours)		1020	28760	157685	374839	783	25583	1573	7021	92135	8928
BTSs accumulated downtime (not available for service)	≤ 2%	0.36%	0.13%	1.89%	1.59%	0.02%	0.28%	0.17%	0.08%	2.37%	0.07%
Number of BTSs having accumulated downtime >24 hours		4	83	161	86	3	155	0	2	16	18
Worst affected BTSs due to downtime	≤ 2%	1.04%	0.28%	1.44%	0.27%	0.06%	1.28%	0.00%	0.02%	0.31%	0.10%
Live Measurement Results for Network Availability- 3 Day live data										
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		384	29440	9178	31437	5415	12149	1279	11268	5200	17402
Sum of downtime of BTSs in a month (in hours)		143	2392	10952	26872	105	1115	106	531	10907	553
BTSs accumulated downtime (not available for service)	≤ 2%	0.52%	0.11%	1.66%	1.19%	0.03%	0.13%	0.12%	0.07%	2.91%	0.04%
Number of BTSs having accumulated downtime >24 hours		0	10	40	0	0	75	0	0	4	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.03%	0.44%	0.00%	0.00%	0.62%	0.00%	0.00%	0.08%	0.00%

Data Source: Operations and Maintenance Center (OMC) of the operators

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11.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
CSSR	≥ 95%	97.91%	98.92%	96.94%	97.21%	99.06%	96.33%	97.73%	99.12%	98.34%	99.44%
SDCCH/Paging channel congestion	≤ 1%	0.37%	0.07%	0.43%	0.38%	NA	0.08%	NA	0.08%	0.20%	0.18%
TCH congestion	≤ 2%	0.00%	0.50%	1.28%	1.42%	0.23%	0.80%	0.03%	0.06%	0.66%	0.56%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
CSSR	≥ 95%	97.20%	98.92%	97.40%	97.13%	99.10%	96.18%	97.91%	99.09%	98.82%	99.49%
SDCCH/Paging channel congestion	≤ 1%	0.28%	0.04%	0.43%	0.35%	NA	0.08%	NA	0.06%	0.11%	0.09%
TCH congestion	≤ 2%	0.00%	0.43%	1.06%	1.50%	0.23%	0.91%	0.06%	0.06%	0.37%	0.51%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of call attempts		1019	6500	6119	6191	6020	5840	2109	6064	6002	6452
Total number of successful calls established		1018	6498	6004	6176	5997	5777	2095	6059	5994	6433
CSSR	≥ 95%	99.90%	99.97%	98.12%	99.76%	99.62%	98.92%	99.34%	99.92%	99.87%	99.71%
%age blocked calls		0.10%	0.03%	1.88%	0.24%	0.38%	1.08%	0.66%	0.08%	0.13%	0.29%

Data Source: Network Operations Center (NOC) of the operators and Data Source: Drive test reports submitted by operators to auditors

11.3   Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of calls established		6175	1021453165	1856503131	2068254542	126217761	382973363	16947592	263834655	220946137	15525601
Total number of calls dropped		43	7002332	21930812	12531112	93523	670888	44794	1404694	1481328	88696
Call drop rate	≤ 2%	0.70%	0.69%	1.18%	0.61%	0.07%	0.18%	0.26%	0.53%	0.67%	0.57%
Total number of cells in the network		1152	91825	34940	94880	16353	37376	3431	26503	15923	52474
Total number of cells having more than 3% TCH		6	1464	618	1168	80	234	98	584	399	1537
Worst affected cells having more than 3% TCH	≤ 3%	0.52%	1.59%	1.77%	1.23%	0.49%	0.63%	2.84%	2.21%	2.51%	2.93%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of calls established		582	100691780	134301131	201146240	12477339	37237608	1447675	26340084	204204211	25278606
Total number of calls dropped		2	689479	1567380	1221460	9813	65083	3663	138440	1240979	153733
Call drop rate	≤ 2%	0.34%	0.68%	1.17%	0.61%	0.08%	0.17%	0.25%	0.53%	0.61%	0.61%
Total number of cells in the network		1152	91267	28121	93873	16353	37260	3431	26508	15872	52358
Total number of cells having more than 3% TCH		5	1470	497	1147	72	236	67	449	138	1540
Worst affected cells having more than 3% TCH	≤ 3%	0.43%	1.61%	1.77%	1.22%	0.44%	0.63%	1.95%	1.69%	0.87%	2.94%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

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Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data										
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of calls established		1012	6498	6010	6178	5998	5776	1962	6059	5999	6433
Total number of calls dropped		3	1	56	4	21	35	0	0	0	0
Call drop rate	≤ 2%	0.30%	0.02%	0.93%	0.06%	0.35%	0.61%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

11.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data										
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of sample calls		486324	145397096719	0	197448855016	0	50117687198	230196344	33774621108	23048802840	2378161888
Total number of calls with good voice quality		481138	142334396875	0	193188108666	0	49370989856	228436166	33405652867	22667187012	2351684238
%age calls with good voice quality	≥ 95%	98.93%	97.89%	NA	97.84%	NA	98.51%	99.24%	98.91%	98.34%	98.89%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

Live measurement results for Voice quality-3 Day data										
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of sample calls		61307	14539673447	0	19677540121	0	5047964126	38342433	3384180312	20826545868	3883052174
Total number of calls with good voice quality		60745	14231126424	0	19251354494	0	4972465412	38042795	3349713051	20534632381	3839485751
%age calls with good voice quality	≥ 95%	99.08%	97.88%	NA	97.83%	NA	98.50%	99.22%	98.98%	98.60%	98.88%
Drive test results for Voice quality (Average of three drive tests) - DT data										
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of sample calls		2841941	13789906	794332	9081527	0	1378656	0	13892114	12049730	12324265
Total number of calls with good voice quality		2812530	13505486	760406	8801901	0	1306291	0	13652169	11877697	12153618
%age calls with good voice quality	≥ 95%	98.97%	97.94%	95.73%	96.92%	NA	94.75%	NA	98.27%	98.57%	98.62%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

11.5   POI CONGESTION

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		51	279	459	810	133	446	162	162	110	132
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		6551	796863	555395	768190	57603	318602	132479	132479	59965	219858
Traffic served for all POIs (B)- in erlangs		2	524743	96638	314706	43008	171090	70719	70719	42105	183579
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		51	279	367	810	134	450	162	162	109	132
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		6551	788790	433676	502309	56417	322889	132479	132479	60076	383959
Traffic served for all POIs (B)- in erlangs		2	480997	93042	295714	44928	169527	70719	70719	27316	279534
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

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12 ANNEXURE – CONSOLIDATED-3G

12.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
(Number of Node Bs in the network in the licensed service area		11784	3381	15982	4138
Sum of downtime (i.e. total outage time) of Node Bs		13167	39590	98910	2064
Node Bs downtime (not available for service)	≤ 2%	0.15%	1.57%	0.83%	0.07%
Number of Node Bs having accumulated downtime of >24 hours in a month		49	46	12	0
Worst affected Node Bs due to downtime	≤ 2%	0.42%	1.36%	0.08%	0.00%
Live Measurement Results for Network Availability- 3 Day live data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
(Number of Node Bs in the network in the licensed service area		10621	2730	15741	4138
Sum of downtime (i.e. total outage time) of Node Bs		855	2754	7289	127
Node Bs downtime (not available for service)	≤ 2%	0.11%	1.40%	0.64%	0.04%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	11	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.40%	0.00%	0.00%

Data Source: Operations and Maintenance Center (OMC) of the operators

12.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
CSSR	≥ 95%	99.80%	97.33%	99.59%	98.20%
RRC Congestion	≤ 1%	0.02%	0.75%	0.08%	0.38%
Circuit Switched RAB Congestion	≤ 2%	0.07%	0.38%	0.09%	0.85%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
CSSR	≥ 95%	99.84%	96.94%	99.64%	98.21%
RRC Congestion	≤ 1%	0.01%	0.75%	0.06%	0.39%
Circuit Switched RAB Congestion	≤ 2%	0.05%	0.35%	0.08%	0.78%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data					
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total number of RRC attempts (A)		2901	3851	5591	2571
Total number of RRC established (B)		2900	3735	5574	2267
Call setup success rate (B/A*100)	≥ 95%	99.97%	96.99%	99.70%	88.18%
%age blocked calls		0.03%	3.01%	0.30%	11.82%

Data Source: Network Operations Center (NOC) of the operators and Data Source: Drive test reports submitted by operators to auditors

12.3   CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total calls successfully established (A) (Number of voice RAB normally released)		59370620	349583090	217886406	56081605
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		180542	1337187	1479941	202298
Call drop rate (B/A*100)	≤ 2%	0.30%	0.38%	0.68%	0.36%
Total no. of cells in the licensed service area (B)		36033	8702	48497	13079
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		737	138	908	257
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.05%	1.58%	1.87%	1.97%

Data Source: Network Operations Center (NOC) of the operators

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Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total calls successfully established (A) (Number of voice RAB normally released)		5544513	30631404	22050221	5566593
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		16586	130632	165002	20773
Call drop rate (B/A*100)	≤ 2%	0.30%	0.43%	0.75%	0.37%
Total no. of cells in the licensed service area (B)		32257	7227	48758	12986
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		650	123	944	160
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.01%	1.70%	1.94%	1.23%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data					
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total calls successfully established (A) (Number of voice RAB normally released)		2900	3733	5574	2569
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		1	41	6	0
Call drop rate (B/A*100)	≤ 2%	0.03%	1.10%	0.11%	0.00%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

12.4   VOICE QUALITY

Audit Results for Voice quality -PMR Data					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		120083209840	0	289987384465	140807190500
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		119894208191	0	288406172857	140432321699
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.84%	NA	99.45%	99.73%
Live measurement results for Voice quality-3 Day data					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		11841303426	0	28778542834	14122554000
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		11822854725	0	28551438722	14084049665
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.84%	NA	99.21%	99.73%
Drive test results for Voice quality (Average of three drive tests) - DT data					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		20267505	1202979	30303327	9766086
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		20055355	1016233	29494495	9918872
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.95%	84.48%	97.33%	101.56%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

12.5 POI CONGESTION

Audit Results for POI Congestion- PMR data					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total number of working POIs		279	459	810	162
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		796863	555395	768190	132531
Traffic served for all POIs (B)- in erlangs		524743	96617	314706	71722
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G
Total number of working POIs		279	367	810	162
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		788792	433676	502305	132531
Traffic served for all POIs (B)- in erlangs		491259	93694	293426	71722
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

13   ANNEXURE – CUSTOMER SERVICES

13.1 `METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated										
Billing Performance	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)											
Metering and billing credibility - Postpaid											
Total bills generated during the period		9	590067	867344	1490585	266753	400613	16286	142443	0	475895
Total number of bills disputed		0	996	165	7261	235	356	0	4	0	1126
Total number of valid billing complaints		0	142	165	908	235	356	0	4	0	484
Total complaints considered invalid		0	854	0	6353	0	0	0	0	0	642
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.17%	0.02%	0.49%	0.09%	0.09%	0.00%	0.00%	NA	0.24%
January											
Total bills generated during the first billing cycle		3	197568	289495	485536	88050	136286	5461	46416	0	155434
Total number of bills disputed in first billing cycle		0	348	96	2133	77	124	0	0	0	363
Total number of valid billing complaints (billing cycle 1)		0	41	96	285	77	124	0	0	0	181
Total complaints considered invalid (billing cycle 1)		0	307	0	1848	0	0	0	0	0	182
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.18%	0.03%	0.44%	0.09%	0.09%	0.00%	0.00%	NA	0.23%

Data Source: Billing Center of the operators

February	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total bills generated during the second billing cycle		3	196114	289464	499146	90249	134367	5462	47746	0	158248
Total number of bills disputed in second billing cycle		0	371	44	2531	79	118	0	0	0	347
Total number of valid billing complaints (billing cycle 2)		0	62	44	394	79	118	0	0	0	152
Total complaints considered invalid (billing cycle 2)		0	309	0	2137	0	0	0	0	0	195
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.19%	0.02%	0.51%	0.09%	0.09%	0.00%	0.00%	NA	0.22%
March											
Total bills generated during the third billing cycle		3	196385	288385	505903	88454	129960	5363	48281	0	162213
Total number of bills disputed in third billing cycle		0	277	25	2597	79	114	0	4	0	416
Total number of valid billing complaints (billing cycle 3)		0	39	25	229	79	114	0	4	0	151
Total complaints considered invalid (billing cycle 3)		0	238	0	2368	0	0	0	0	0	265
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.14%	0.01%	0.51%	0.09%	0.09%	0.00%	0.01%	NA	0.26%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid											
Performance prepaid	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of charging complaints (valid) - sum of 3 months		0	121	5792	12859	1891	9120	0	0	12	11582
Total complaints considered invalid (sum of 3 months)		0	3189	0	16952	0	0	0	0	0	2329
Total number of charging complaints (sum of 3 months)		0	3310	5792	29811	1891	9120	0	0	12	13911
Total no of customers served (Sum of 3 months)		20691	36153775	11578132	20823279	6325015	30419180	598793	16739394	10601102	20048863
Percentage of charging complaints disputed	≤ 0.1%	0.00%	0.01%	0.05%	0.14%	0.03%	0.03%	0.00%	0.00%	0.00%	0.07%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of billing/charging complaints		0	4306	5957	37072	2126	9476	0	4	12	15037
Total number of complaints resolved in favour of customer		0	263	5957	13767	2126	9476	0	4	12	12066
Total complaints considered invalid		0	4043	0	23305	0	0	0	0	0	2971
Number of complaints resolved in 4 weeks		0	263	5950	13767	2126	9476	0	4	12	12066
Percentage complaints resolved within 4 weeks	≥ 98%	NA	100.00%	99.88%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		0	263	5957	13767	2126	9476	0	4	12	12066
Percentage complaints resolved within 6 weeks	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		0	263	2	13767	2126	9476	0	4	12	4822
Percentage cases in which credit/waiver was received within 1 week	100%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for resolution of billing complaints											
Resolution of billing complaints	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total Number of calls made		NA	100	100	100	100	100	NA	62	11	58
Number of cases resolved in 4 weeks		NA	73	84	73	92	100	NA	36	11	41
Percentage cases resolved in 4 weeks	≥ 98%	NA	73.00%	84.00%	73.00%	92.00%	100.00%	NA	58.06%	100.00%	70.69%
Number of cases resolved in 6 weeks		NA	100	100	100	92	100	NA	36	11	41
Percentage cases resolved in 6 weeks	100.00%	NA	100.00%	100.00%	100.00%	92.00%	100.00%	NA	58.06%	100.00%	70.69%

Data Source: Billing Center of the operators

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13.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of call attempts to customer care for assistance		8145	3247234	4125890	66011487	1871821	13632177	NA	1023502	8486230	12456119
Number of calls getting connected and answered (electronically)		7998	3247234	4119189	62761116	1823946	13298644	NA	999923	8486230	12456119
Percentage calls getting connected and answered	≥ 95%	98.20%	100.00%	99.84%	95.08%	97.44%	97.55%	100.00%	97.70%	100.00%	100.00%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total Number of calls received (3 months)		712	4210945	2064472	11522366	890878	4387297	35269	1677811	2194839	5225827
Total Number of calls answered within 90 seconds (3 months)		711	3463498	2032315	11161021	766711	4044076	35098	1581771	2125438	5187873
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	99.86%	82.25%	98.44%	96.86%	86.06%	92.18%	99.52%	94.28%	96.84%	99.27%
Audit results for customer care (voice-to-Voice)- Monthly data											
January											
Total calls received (Month 1)		194	1354635	702891	3960911	261428	1432912	11943	602614	826139	1788913
Total calls answered within 90 seconds (Month 1)		193	1294780	693321	3721441	243561	1332891	11898	534816	799618	1771126
% calls answered within 90 seconds (Month 1)	≥ 95%	99.48%	95.58%	98.64%	93.95%	93.17%	93.02%	99.62%	88.75%	96.79%	99.01%

Data Source: Customer Service Center of the operators

Audit results for customer care (voice-to-Voice)- Monthly data										
February										
Total calls received (Month 2)		206	1314200	669640	3554007	281337	1467997	11651	522126	699702	1651997
Total calls answered within 90 seconds (Month 2)		206	1262804	657088	3527464	233991	1333174	11608	500367	674832	1640463
% calls answered within 90 seconds (Month 2)	≥ 95%	100.00%	96.09%	98.13%	99.25%	83.17%	90.82%	99.63%	95.83%	96.45%	99.30%
March										
Total calls received (Month 3)		312	1542110	691941	4007448	348113	1486388	11675	553071	668998	1784917
Total calls answered within 90 seconds (Month 3)		312	905914	681906	3912116	289159	1378011	11592	546588	650988	1776284
% calls answered within 90 seconds (Month 3)	≥ 95%	100.00%	58.75%	98.55%	97.62%	83.06%	92.71%	99.29%	98.83%	97.31%	99.52%

Data Source: Customer Service Center of the operators

Live calling results for customer care (IVR)										
Customer Care Assessment	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	100	100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)										
Customer Care Assessment	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total Number of calls received		100	100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	100	100	100	100	100	100	100	100	100
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Live calling made by the auditors

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13.3   TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated										
Termination	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of closure request		NA	3479	NA	9613	795	688	249	1204	NA	6545
Number of requests attended within 7 days		NA	3454	NA	9560	795	688	249	1204	NA	6545
Percentage cases in which termination done within 7 days	100.00%	NA	99.28%	NA	99.45%	100.00%	100.00%	100.00%	100.00%	NA	100.00%

Data Source: Customer Service Center of the operators

13.4   TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated										
Refund	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of cases requiring refund of deposits		NA	247	NA	2409	NA	NA	33	121	NA	4998
Total number of cases where refund was made within 60 days		NA	247	NA	2409	NA	NA	33	121	NA	4998
Percentage cases in which refund was receive within 60 days	100.00%	NA	100.00%	NA	100.00%	NA	NA	100.00%	100.00%	NA	100.00%

Data Source: Billing Center of the operators

13.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests										
Resolution of service requests	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total Number of calls made	NA	100	100	100	100	100	NA	51	47	0
Number of cases resolved to satisfaction	NA	84	75	75	70	86	NA	19	36	0
Percentage cases resolved in four weeks	NA	84.00%	75.00%	75.00%	70.00%	86.00%	NA	37.25%	76.60%	NA

Data Source: Live calls made by auditors from operator's network

13.6 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services											
Level 1 services		Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total no. of calls made		300	300	300	300	300	300	300	300	300	300
Calls answered		220	300	300	300	300	300	234	158	158	131
% of calls connected	≥ 95%	73.33%	100.00%	100.00%	100.00%	100.00%	100.00%	78.00%	52.67%	52.67%	43.67%

Data Source: Live calls made by auditors from operator's network

13.7 LEVEL 1 SERVICE CALLS MADE

All the numbers given in mandatory list in Section 2.4.2.4.1 were tested. The following table provides the numbers that are activated for each operator. A tick (✔) for an operator signifies that the number was active for the operator.

Live calls were made to the active numbers to test the calls answered. The details of the same have been given below for each operator.

Aircel						
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		15	8
101	Fire	Y		14	9
102	Ambulance	Y		14	8
104	Health Information Helpline	Y		14	8
108	Emergency and Disaster Management Helpline	Y		14	8
138	All India Helpline for Passengers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		14	8
182	Indian Railway Security Helpline	Y		14	8
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services	Y		15	8
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		14	9

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		14	8
1073	Road Accident Helpline	Y		14	8
1077	Control Room for District Collector	Y		14	8
10120	Call Alert (Crime Branch)	Y		14	8
10121	Women Helpline	Y		14	8
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)	Y		14	8
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		15	8
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		15	8
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		14	9
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		15	8
112012	National Do Not Call Registry	Y		15	8
11212	Complaint of Electricity	Y		14	8
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		16	15

101	Fire	Y		16	15
102	Ambulance	Y		16	15
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		15	14
138	All India Helpline for Passengers	Y		16	15
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		16	15
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		16	14
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		15	15
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	15
1073	Road Accident Helpline	Y		16	14
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)	Y		16	15
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		16	15
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationall & Vocational Guidance and Counselling		N		

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		16	15
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project				
1512	Prevention of Crime in Railway	Y		16	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		16	15
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		16	16
112012	National Do Not Call Registry	Y		16	16
11212	Complaint of Electricity	Y		15	15
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		15	15
BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		16	15
101	Fire	Y		16	15
102	Ambulance	Y		16	15
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		15	14
138	All India Helpline for Passengers	Y		16	15
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		16	15
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		16	14

Number	Service				
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		15	15
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	15
1073	Road Accident Helpline	Y		16	14
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)	Y		16	15
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		16	15
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		16	15
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		16	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		16	15
155154	Municipal Corporations		N		
155214	Labour Helpline		N		

11203	Sashastra Seema Bal (SSB)	Y		16	15
112012	National Do Not Call Registry	Y		16	15
11212	Complaint of Electricity	Y		15	15
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		15	15
Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	16
101	Fire	Y		16	16
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		17	16
138	All India Helpline for Passengers	Y		16	16
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		17	15
182	Indian Railway Security Helpline	Y		17	16
1033	Road Accident Management Service	Y		16	15
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	16

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
1073	Road Accident Helpline	Y		17	16
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)	Y		16	15
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	16
101212	Central Accident and Trauma Services (CATS)	Y		17	16
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		17	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		17	16
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		17	16
112012	National Do Not Call Registry	Y		17	16
11212	Complaint of Electricity	Y		17	16
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		17	16
Reliance CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		20	10
101	Fire	Y		20	11
102	Ambulance		N		

104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		20	10
138	All India Helpline for Passengers	Y		20	10
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		20	11
182	Indian Railway Security Helpline	Y		20	11
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		20	11
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		20	10
1073	Road Accident Helpline	Y		20	11
1077	Control Room for District Collector	Y		20	11
10120	Call Alert (Crime Branch)	Y		20	10
10121	Women Helpline	Y		20	11
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)	Y		20	10
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		20	10
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		20	10
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
Reliance GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		20	10
101	Fire	Y		20	9
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		20	9
138	All India Helpline for Passengers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		20	10
182	Indian Railway Security Helpline	Y		20	9
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		

1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		20	9
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		20	9
1073	Road Accident Helpline	Y		20	9
1077	Control Room for District Collector	Y		20	9
10120	Call Alert (Crime Branch)	Y		20	9
10121	Women Helpline	Y		20	9
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)	Y		20	10
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		20	10
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		20	10
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		20	9

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
TATA CDMA					
100	Police	Y		18	9
101	Fire	Y		18	9
102	Ambulance	Y		17	9
104	Health Information Helpline	Y		17	9
108	Emergency and Disaster Management Helpline	Y		18	9
138	All India Helpline for Passengers	Y		18	9
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		17	8
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		17	9
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		17	8
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		18	9
1073	Road Accident Helpline	Y		17	8
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)		N		

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		18	9
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		18	9
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	8
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		18	8
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		18	8
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		18	8
TATA GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		19	19
101	Fire	Y		19	19
102	Ambulance	Y		18	18
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		19	19

138	All India Helpline for Passengers	Y		19	19
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		19	19
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		18	18
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		18	18
1071	Air Accident Helpline				
1072	Rail Accident Helpline	Y		19	19
1073	Road Accident Helpline	Y		19	19
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		19	19
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		18	18
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		

1512	Prevention of Crime in Railway	Y		19	19
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		19	19
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		19	19
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		19	19
Videocon					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	10
101	Fire	Y		17	10
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		17	10
138	All India Helpline for Passengers	Y		17	10
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		17	9
182	Indian Railway Security Helpline	Y		17	10
1033	Road Accident Management Service	Y		17	9
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		

1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		17	10
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	10
1073	Road Accident Helpline	Y		16	9
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)	Y		17	9
10121	Women Helpline	Y		16	9
10127	National AIDS Helpline to NACO	Y		16	10
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		17	10
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		16	9
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		17	10
112012	National Do Not Call Registry	Y		16	10
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		17	10
Vodafone					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		23	16
101	Fire	Y		23	16
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		23	16
138	All India Helpline for Passengers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		25	14
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		23	16
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		23	16
1073	Road Accident Helpline	Y		23	16
1077	Control Room for District Collector	Y		23	16
10120	Call Alert (Crime Branch)	Y		23	16
10121	Women Helpline	Y		23	16
10127	National AIDS Helpline to NACO		N		

101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		23	16
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		23	16
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		23	16
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

Data Source: Live calls made by auditors from operator's network

14 COUNTER DETAILS

Sl No.	KPI	Formula with Counter Description
1	CSSR= (No of established Calls / No of Attempted Calls)%	*No of established Calls =* ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)] +[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)])))/*No of Attempted Calls =* ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Changeable)])
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	*SDCCH Failure=* ([Channel Assignment Failures (All Channels Busy or Channels Unconfigured) in Immediate Assignment Procedure (SDCCH)] + [Failed Internal Intra-Cell Handovers (No Channel Available) (SDCCH)] + [Number of Unsuccessful Incoming Internal Inter-Cell Handovers (No Channel Available) (SDCCH)] + [Failed Incoming External Inter-Cell Handovers (No Channel Available) (SDCCH)])/*SDCCH attempts =* ([Channel Assignment Requests in Immediate Assignment Procedure (SDCCH)] + [Internal Intra-Cell Handover Requests (SDCCH)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)])
3	TCH congestion= (TCH Failures /TCH Attempts)%	*TCH Failures=* ((Failed TCH Seizures due to Busy TCH (Signaling Channel)+([Failed Assignments (First Assignment, No Channel Available in Assignment Procedure)]+[Failed Assignments (First Assignment, No Channel Available in Directed Retry Procedure)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Assignment)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Directed Retry)])/*TCH Attempts =* ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type

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4	**Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)**	*The total no of dropped calls=* ([Call Drops on Radio Interface in Stable State (Traffic Channel)] + [Call Drops on Radio Interface in Handover State (Traffic Channel)] + [Call Drops Due to No MR from MS for a Long Time (Traffic Channel)] + [Call Drops due to Abis Terrestrial Link Failure (Traffic Channel)] + [Call Drops due to Equipment Failure (Traffic Channel)] + [Call Drops due to Forced Handover (Traffic Channel)] + [Call Drops due to local switching Start Failure] + [Call Drops due to Failures to Return to Normal Call from local switching])/*Total no of calls successfully established (where traffic channel is allotted) =* ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)] +[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)])
5	**Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area**	**Above formula with counters being used in CBBH.**
6	**Connection with good quality voice= (Connection with good quality voice/Total voice samples)%**	*Connection with good quality voice =* ((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)) /*Total voice samples=* ((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHF (Receive Quality Rank 6)+Number of MRs on Downlink TCHF (Receive Quality Rank 7)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+:Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 6)+Number of MRs on Downlink TCHH (Receive Quality Rank 7))

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14.1.1 ERICSSON

Ericsson provides network support to Aircel, Airtel, Idea, BSNL and Reliance GSM in the circle.

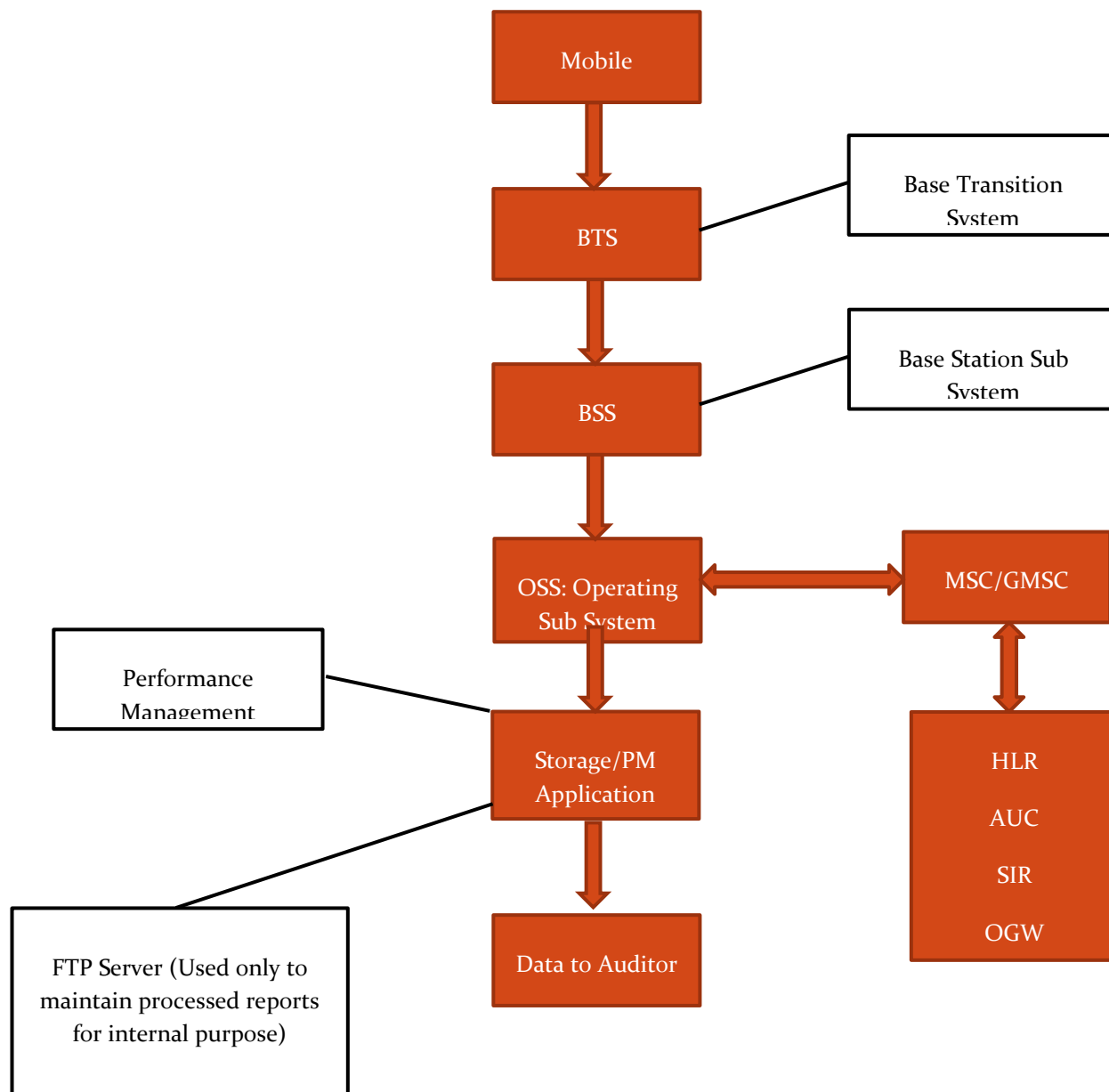| SI No.	KPI	Ericsson
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR (No of established Calls / No of Attempted Calls)=(TCASSALL/TASSALL)*100
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	SDCCH congestion (SDCCH Failure/SDCCH attempts)% = (CCONGS/CCALLS)*100
3	TCH congestion= (TCH Failures /TCH Attempts)%	TCH congestion (TCH Failures /TCH Attempts)%= (CNRELCONG+TNRELCONG)/TASSALL)*100
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	Call Drop Rate (Total no dropped calls/No of established calls)%= (TNDROP)/TCASSALL*100
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	Connection with good quality voice (Connection with good quality voice samples 0-5 /Total voice samples)= 100 * (QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL) / (QUAL70DL + QUAL60DL + QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL)

Ericsson Counters

Counter	Counter Description
TCASSALL	Number of assignment complete messages on TCH for all MS classes
TASSALL	Number of first assignment attempts on TCH for all MS classes.
CNRELCONG	Number of released connections on SDCCH due to TCH or Transcoder (TRA) congestion.
TNRELCONG	Number of released TCH signalling connections due to transcoder resource congestion during immediate assignment on TCH
CCONGS	Congestion counter for SDCCH. Stepped per congested allocation attempt.
CCALLS	Channel allocation attempt counter on SDCCH.

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TNDROP	The total number of dropped TCH Connections.
QUAL00DL	Number of quality 0 reported on downlink.
QUAL10DL	Number of quality 1 reported on downlink.
QUAL20DL	Number of quality 2 reported on downlink.
QUAL30DL	Number of quality 3 reported on downlink.
QUAL40DL	Number of quality 4 reported on downlink.
QUAL50DL	Number of quality 5 reported on downlink.
QUAL60DL	Number of quality 6 reported on downlink.
QUAL70DL	Number of quality 7 reported on downlink.

14.1.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.

Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR= 100-100*((SDCCH_BUSY_ATT)-(TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL)+(SDCCH_RF_OLD_HO)+(SDCCH_USER_ACT)+(SDCCH_BCSU_RESET)+(SDCCH_NETW_ACT)+(SDCCH_BTS_FAIL)+(SDCCH_LAPD_FAIL)+ (BLCK_8I_NOM)/ {(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	SDCCH congestion = (sdcch_busy_att - .tch_seiz_due_sdcch_con)/{(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
3	TCH congestion= (TCH Failures /TCH Attempts)%	TCH congestion = BLCK_8I_NOM / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	TCH Drop = (drop_after_tch_assign)-(tch_re_est_release) / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	Connection with good quality voice= (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5) / (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5+FREQ_DL_QUAL6+FREQ_DL_QUAL7)

14.2 BLOCK SCHEMATIC DIAGRAMS

14.2.1 ERICSSON

Ericsson provides network support to Aircel, Airtel, Idea, BSNL and Reliance GSM in the circle.

Ericsson

```
                    ┌──────────┐
                    │  Mobile  │──────────► ┌─────────────────┐
        ┌───────────┤          │           │ Base Transition │
        │           └────┬─────┘           │     System      │
        ▼                ▼         ┌───────►└─────────────────┘
   ┌────────┐       ┌────────┐     │        ┌────────┐
   │  BTS   │       │  BTS   │─────┘        │  BTS   │
   └────────┘       └───┬────┘              └────────┘
                        ▼
                   ┌────────┐              ┌─────────────────┐
                   │  BSS   │──────────────│ Base Station Sub│
                   └───┬────┘              │     System      │
                       ▼                   └─────────────────┘
                  ┌──────────┐             ┌──────────┐
                  │ MSC/GMSC │────────────►│   HLR    │
                  └────┬─────┘             │   AUC    │
   ┌──────────┐        ▼                   │   SIR    │
   │ 7 Days   │   ┌──────────┐             │   OGW    │
   │ Storage  │───│ OSS/OMCR │             └──────────┘
   └──────────┘   └────┬─────┘
                       ▼
                  ┌──────────┐
                  │  Server  │
                  └────┬─────┘
                       ▼
                  ┌──────────┐
                  │FTP Server│
                  └────┬─────┘
                       ▼
                  ┌──────────┐
                  │ Data to  │
                  │ Auditor  │
                  └──────────┘
```
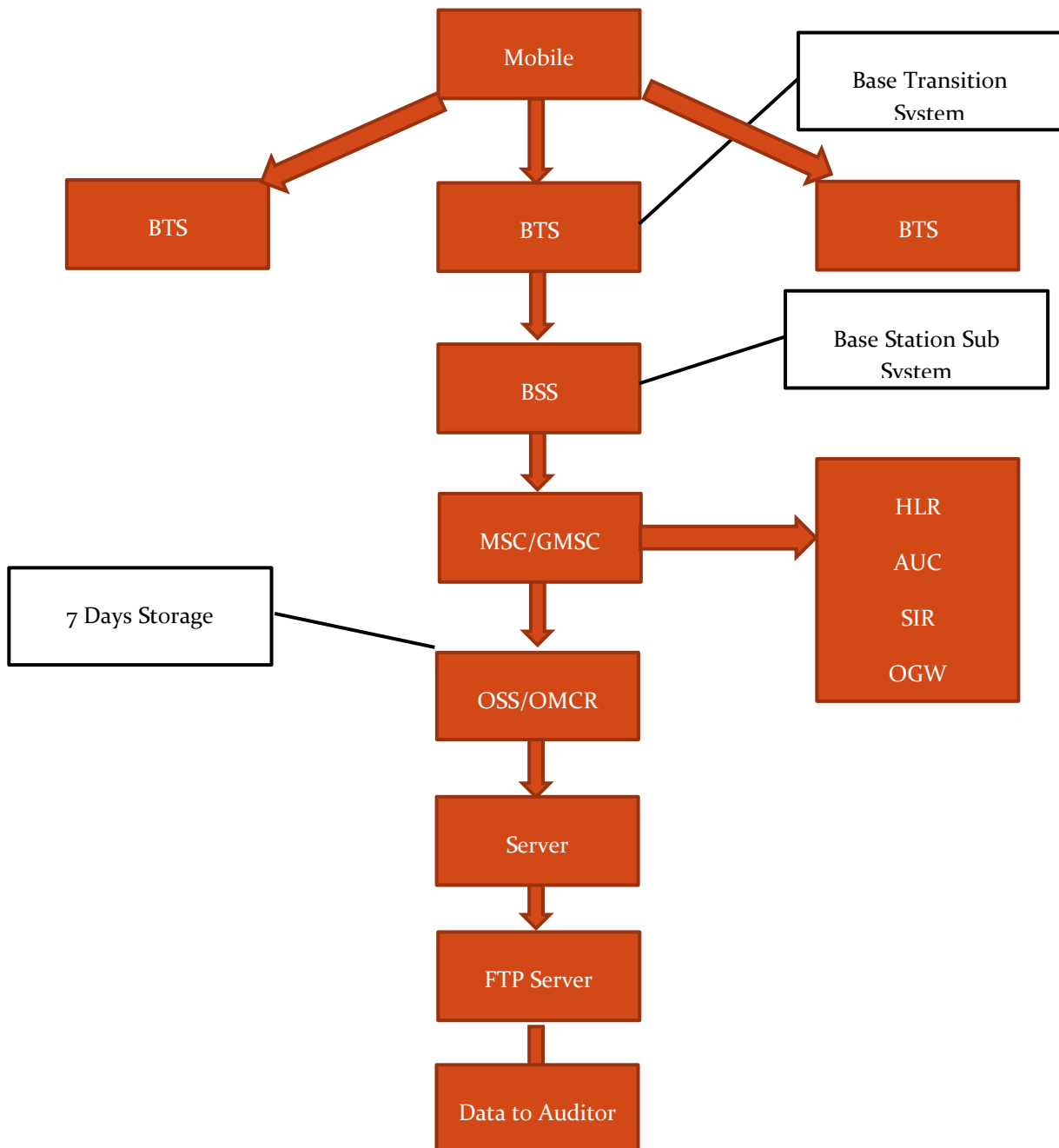
14.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.

NSN

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                          ┌──────────────┐
                          │    Mobile    │
                          └──────┬───────┘
                                 ▼
                          ┌──────────────┐          ┌─────────────────────┐
                          │     BTS      │──────────│  Base Transition    │
                          └──────┬───────┘          │  System             │
                                 ▼                  └─────────────────────┘
                          ┌──────────────┐          ┌─────────────────────┐
                          │     BSS      │──────────│  Base Station Sub   │
                          └──────┬───────┘          │  System             │
                                 ▼                  └─────────────────────┘
                          ┌──────────────┐          ┌─────────────────────┐
                          │ OSS: Operating│◄────────►│     MSC/GMSC        │
                          │  Sub System  │          └──────────┬──────────┘
                          └──────┬───────┘                     ▲
  ┌────────────────┐             ▼                             ▼
  │  Performance   │      ┌──────────────┐          ┌─────────────────────┐
  │  Management    │──────│  Storage/PM  │          │        HLR          │
  └────────────────┘      │  Application │          │        AUC          │
                          └──────┬───────┘          │        SIR          │
  ┌────────────────┐             │                  │        OGW          │
  │ FTP Server     │─────────────┘                  └─────────────────────┘
  │ (Used only to  │      ┌──────────────┐
  │ maintain       │      │   Data to    │
  │ processed      │      │   Auditor    │
  │ reports for    │      └──────────────┘
  │ internal       │
  │ purpose)       │
  └────────────────┘
```

15 ABBREVIATIONS

Following terms/abbreviations have been used in this report. This section provides meaning of the abbreviations used in the report.

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. JFM'16 – Refers to the quarter of January , February and March 2016
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

WEST
ZONE

TRAI AUDIT WIRELINE REPORT – MPCG
CIRCLE - AUDIT OF JFM QUARTER, 2016

Prepared By -

IMRB International | eTech

Prepared For-

TRAI सत्यमेव जयते
Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)

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TRAI
Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)

1 INTRODUCTION

1.1 About TRAI

TRAI's mission is to create and nurture conditions for growth of telecommunications in the country in a manner and at a pace that will enable India to play a leading role in the emerging global information society. One of the main objectives of TRAI is to provide a fair and transparent policy environment which promotes a level playing field and facilitates fair competition.

In pursuance of above objective, TRAI has been issuing regulations, order and directives to deal with the issues or complaints raised by the operators as well as the consumers. These regulations, order and directives have helped to nurture the growth of multi operator multi service - an open competitive market from a government owned monopoly. Also, the directions, orders and regulations issued cover a wide range of subjects including tariff, interconnection and quality of service as well as governance of the Authority.

TRAI initiated a regulation - The Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009) dated 20thMarch, 2009, the "Standards of Quality of Service for Wireless Data Services Regulations, 2012 dated 4th March 2012, and the "Quality of Service of Broadband Service Regulations", 2006 (11 of 2006) dated 6th January, 2006 that provide the benchmarks for the parameters on customer perception of service to be achieved by service provider.

In order to assess the above regulations, TRAI has commissioned a third party agency to conduct the audit of the service providers and check the performance of the operators on the various benchmarks set by Telecom Regulatory Authority of India (TRAI).

1.2 OBJECTIVES

The primary objective of the Audit module is to -

- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).

1.3   COVERAGE

The wireline audit was conducted in MPCG circle.
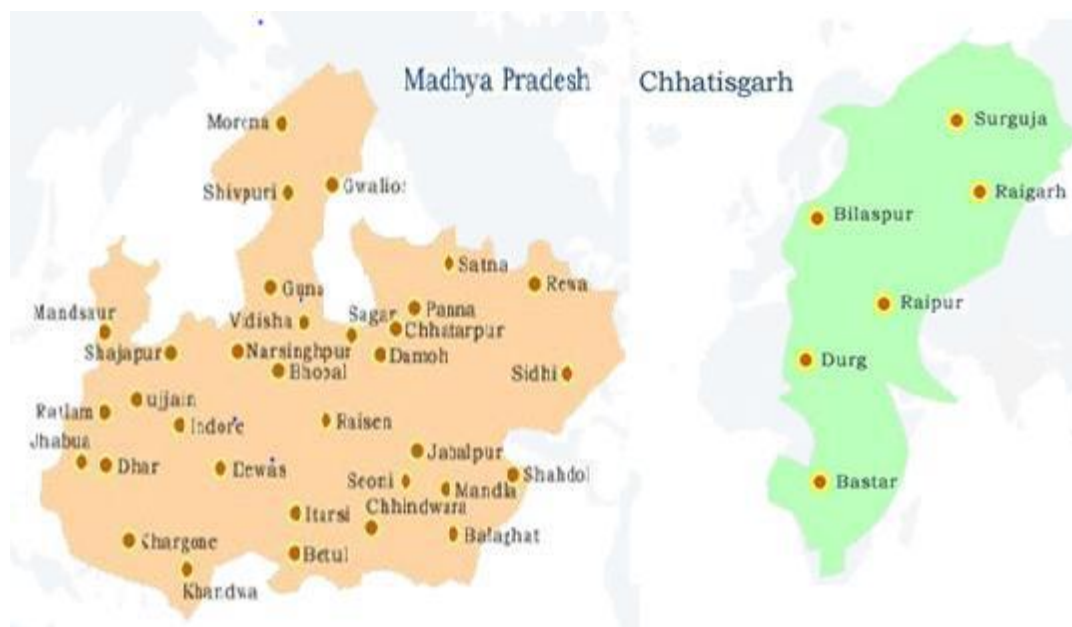
Image Source: Google Maps

1.4   AUDIT PROCESS

As per TRAI guidelines, the Wireline Audit for a circle is conducted for one quarter once every year.

- The operators have been assimilated as per TRAI guidelines given in QoS tender document 2015 and latest list of licensees provided by TRAI.
- IMRB auditors contacted the following wireline operators to conduct the audit in MPCG for the OND 2015 quarter and conducted the audit for all operators.
  - o   BSNL
  - o   Bharti Airtel
  - o   Reliance
  - o   Tata Teleservices
  - o   Vodafone
- The PMR was generated from the raw data pertaining to January, February and March 2016 (JFM'16), which was collected from the operator during the audit conducted in the month of January 2016.
- Live calling and 3 day live measurement activity was carried out during the month of March 2016. The data considered for live calling was for the month prior to the month in which the

live calling activity was being conducted. For example, data of February 2016 was considered for live calling activity conducted in March 2016.

1.5 FRAMEWORK USED
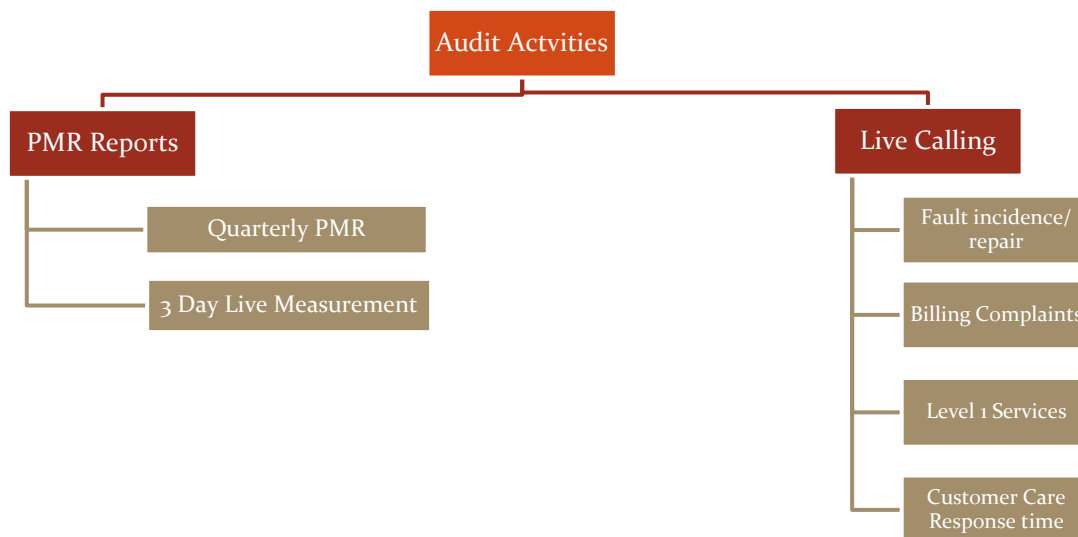
1.5.1 PMR REPORTS - SIGNIFICANCE AND METHODOLOGY

The significance of PMR or Performance Monitoring Reports is to assess the various Quality of Service (QoS) parameters involved in the Basic (Wireline) telephone services, which indicate the overall health of service for an operator. The operators submit these PMR reports to TRAI time on time as per instructions from TRAI.

To verify the QoS performance of the operators, TRAI has appointed IMRB as their auditor in West Zone to conduct QoS audit of operators. The steps involved in the audit have been given below.

The IMRB auditors inform the operators about the audit schedule in advance. Accordingly, the auditors visit the operator premises to conduct the audit.

During TRAI audit, raw data is extracted from the operator's server/ NOC/ exchange/ OMC/ customer service center/ billing center etc. by the IMRB auditor with assistance from the operator personnel in order to generate PMR reports (Network/ Fault/ Billing /Customer Service).

All the calculations are done by IMRB auditors to generate a new PMR report from that raw data.

The newly generated PMR reports are then taken in hard copy, duly signed by the competent authority of operators. IMRB auditors also sign the same report.
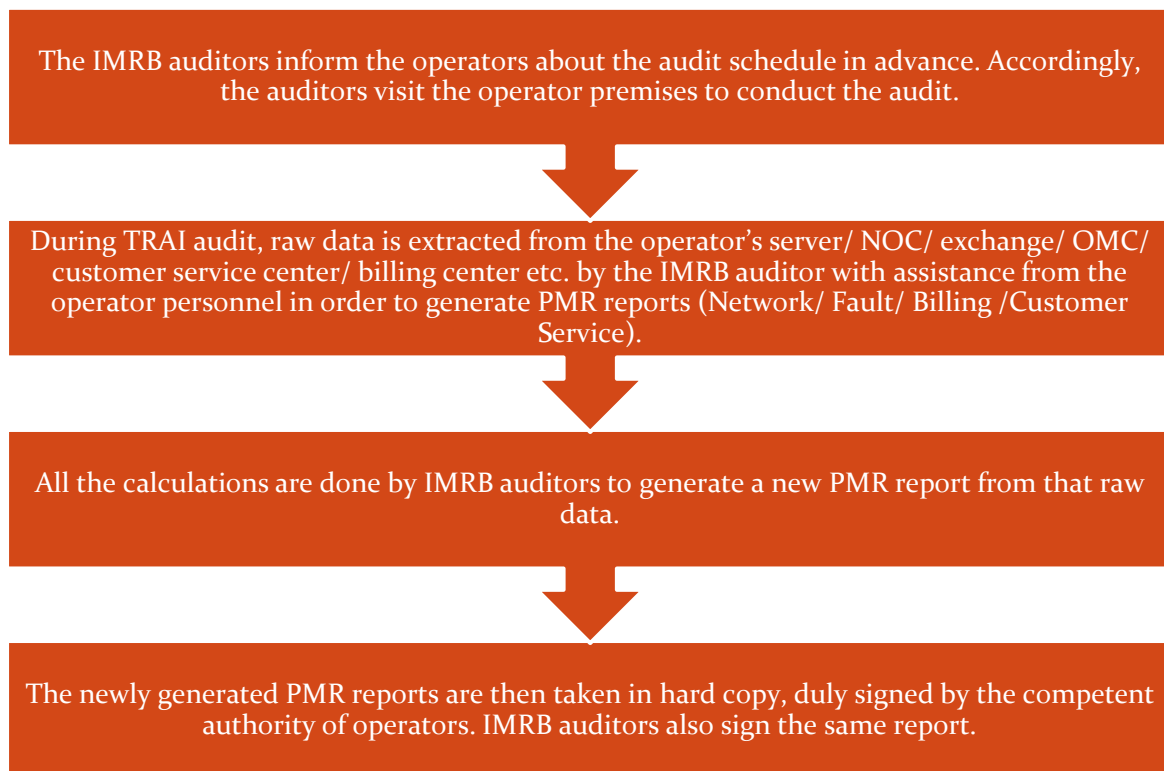
The raw data extracted is then used to generate PMR reports in the following formats.

- ✤ Quarterly PMR
- ✤ 3 Day Live Measurement Data

Let us understand these formats in detail.

1.5.1.1 QUARTERLY PMR REPORT – PARAMETERS REVIEWED

The main purpose of quarterly PMR report is to verify the following key QoS parameters on quarterly basis as per the methodology stated above in section 1.4.

- Fault incidence/clearance related statistic
- Mean Time to Repair (MTTR)
- POI (Point of Interconnection) Congestion
- Metering and billing credibility
- Resolution of billing complaints
- Customer care promptness
- Time taken to refund of deposits after closure

1.5.1.2 3 DAY LIVE MEASUREMENT – METHODOLOGY AND PARAMETERS REVIEWED

The main purpose of 3 day live measurement is to evaluate the following parameters on intraday basis. The auditors visit the sample exchanges (in case of BSNL) and main exchanges (in case of other operators) to collect the 3 day live data for the following parameters

- POI (Point of Interconnection) Congestion

While the quarterly PMR report provides an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the above given parameters. All the calculations are then done on the basis of that raw data of 3 days.

1.5.1.3 TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Time Consistent Busy Hour" or "TCBH" means the one hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration and such Time Consistent Busy Hour shall be established on the basis of analysis of traffic data for a period of ninety days.

Step by step procedure to identify TCBH for an operator:

Day wise raw data is fetched from the operator's OMCR and kept in a readable format (preferably MS-Excel). Data for a period of 90 days is used to identify TCBH.

The 90 day period is decided upon the basis of quarter of audit. For example, for audit of JFM2016, the 90 day period data used to identify TCBH would be the data of January, February & March 2016

For each day, the hour in which average traffic of the resource group concerned is greatest for the day will be the 'Busy Hour' for the operator.

The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as TCBH for the operator

1.5.2 LIVE CALLING - SIGNIFICANCE AND METHODOLOGY

The main purpose of live calling is to verify the performance of following parameters by doing test calls to the subscribers/ specific numbers.

- Fault clearance
- Resolution of billing complaints
- Response time to the customer for assistance
- Level 1 services

The process of conducting live calling has been stated below.

The IMRB auditor visits the operator premises such as main exchanges/ OMC/ customer service center etc. to do live calling. The operators provide the raw data of customer complaints (billing) from the preceding month and also the list of customer service numbers to be verified through live calling

IMRB auditors then make live calls to a random sample of subscribers from the raw data provided to verify the resolution of complaints

The auditors also verify the performance of call center and level 1 services by calling the numbers using operator's wireline network

Let us now discuss the methodology of live calling for each parameter in detail.

1.5.2.1 FAULT CLEARANCE

Live calling for fault clearance is done to verify the following.

- Fault repair by next working day - for both Urban and Rural Exchanges
- Fault repair within 5 working days – Urban Exchanges
- Fault repair within 7 working days – Rural Exchanges

- Auditors request the operator to provide the database of all the subscribers who reported Faults in one month prior to IMRB auditor visit
- Calls are made to up to 10% or 100 complainants, whichever is less, per service provider. If there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.

✤ Auditors check and record whether the fault was corrected within the timeframes as mentioned in the benchmark

Benchmark:

- Fault repair by next working day (Urban Exchanges): =>85%
- Fault repair by next working day (Rural Exchanges): =>75%
- Fault repair within 5 working days (Urban Exchanges): =100%
- Fault repair within 7 working days (Rural Exchanges): =100%

1.5.2.2 RESOLUTION OF BILLING COMPLAINTS

Live calling is done to verify Resolution of billing complaints within stipulated time. The process for this parameter is stated below.

✤ Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically

✤ A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator

✤ Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

Benchmark:

98% complaints resolved within 4 weeks, 100% complaints resolved within 6 weeks

1.5.2.3 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

Live calling is done to verify response time for customer assistance is done to verify the performance of call center in terms of

✤ Calls getting connected and answered:
✤ % age of calls answered by operator / voice to voice) within 90 seconds: In 95% of the cases or more

The process for this parameter is stated below.

✤ Overall sample size is 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS.

✑ Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.

✑ All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

1.5.2.4 LEVEL 1 SERVICE

Level 1 is used for accessing special services like emergency services, supplementary services, inquiry and operator-assisted services. Level 1 Services include services such as police, fire, ambulance (Emergency services). Test calls were made from operator network to test the accessibility and efficiency of Level 1 services on an operator's network.

A minimum of 300 test calls were made per service provider in the quarter. In case of BSNL, calls are equally distributed among SDCAs (Short Distance Charging Area) visited for the purpose of live calling.

In JFM'16, IMRB has conducted the live calling to the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

1.5.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

- On visiting the operator's premises (Exchange/Central Server etc.), auditors ask the operator authorized personnel to provide a list of Level 1 services being active in their service. The list should contain a description of the numbers along with dialing code.
- Operators might provide a long list of L1 services. To identify emergency L1 service numbers, auditors check if there is any number that starts with code '10' in that list. If auditors find any emergency number in addition to the below list, that number is also tested during live calling.
- On receiving the list, auditors verify it if the below given list of numbers are active in the service provider's network.
- If there are any other additional numbers provided by the operator, auditors also do live calling on those numbers along with below list.
- If any of these numbers is not active, then we would write the same in our report, auditors write in the report.
- Post verifying the list, auditors do live calling by equally distributing the calls among the various numbers and update the results in the live calling sheet.

L1 Code	Description	L1 Code	Description
100	Police	1090	Call Alart (Crime Branch)
101	Fire	1091	Women Helpline
102	Ambulance	1097	National AIDS Helpline to NACO
104	Health Information Helpline	1099	Central Accident and Trauma Services (CATS)
108	Emergency and Disaster Management Helpline	10580	Educationa & Vocational Guidance and Counselling
138	All India Helpine for Passangers	10589	Mother and Child Tracking (MCTH)
149	Public Road Transport Utility Service	10740	Central Pollution Control Board
181	Chief Minister Helpline	10741	Pollution Control Board
182	Indian Railway Security Helpline	1511	Police Related Service for all Metro Railway Project
1033	Road Accident Management Service	1512	Prevention of Crime in Railway
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	1514	National Career Service(NCS)
1056	Emergency Medical Services	15100	Free Legal Service Helpline
106X	State of the Art Hospitals	155304	Municipal Corporations
1063	Public Grievance Cell DoT Hq	155214	Labour Helpline
1064	Anti Corruption Helpline	1903	Sashastra Seema Bal (SSB)
1070	Relief Commission for Natural Calamities	1909	National Do Not Call Registry
1071	Air Accident Helpline	1912	Complaint of Electricity
1072	Rail Accident Helpline	1916	Drinking Water Supply
1073	Road Accident Helpline	1950	Election Commission of India
1077	Control Room for District Collector		

1.5.3 AUDIT METHODOLOGY

As per audit tender, following table explains the audit methodology for Basic (Wireline) services. Here, a YES signifies that the mentioned parameter gets audited by the given audit method (PMR/ Live Measurement/ Live Calling).

Sl. No.	Parameters	PMR	Live measurement	Live calling
1	Fault incidence/clearance related statistic	YES		
1.1	- Total number of faults registered per month	YES		
1.2	- Fault repair by next working day (Urban and Rural)	YES		YES
1.3.1	- Fault repair within 5 working days (Urban)	YES		YES
1.3.2	- Fault repair within 7 working days (Rural)	YES		YES
1.4	Mean Time to Repair (MTTR)	YES		
4	POI Congestion	YES	YES	
5	Metering and billing credibility – postpaid	YES		YES
5.1	Metering and billing credibility – prepaid	YES		YES
6	Customer service promptness	YES		

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6.1	- Processing closure request	YES		
7	Response time to customer	YES		
7.1	- While call is getting connected and answered	YES		YES
7.2	- While call is answered by operator (voice to voice)	YES		YES
8	Level 1 Services			YES
9	Time taken to refund of deposits after closure	YES		

The audit methodology for each parameter has been explained along with the findings of same.

BHARTI AIRTEL	BSNL	Reliance	Tata	VODAFONE
16:00 - 17:00	16:00 - 17:00	18:00 - 19:00	17:00 - 18:00	18:00 - 19:00

1.5.4 MEASUREMENT METHODOLOGY

As per audit tender, following table explains the measurement methodology in terms of time period consideration for various parameters involved in audit of Basic (Wireline) services.

Sl. No.	Parameters	Averaged over a period
1	Fault incidence	One Quarter
1.1	- Total number of faults registered per month	One Quarter
1.2	- Fault repair by next working day (Urban and Rural)	One Quarter
1.3.1	- Fault repair within 5 working days (Urban)	One Quarter
1.3.2	- Fault repair within 7 working days (Rural)	One Quarter
1.4	- Mean Time to Repair (MTTR)	One Quarter
4	POI Congestion	One Month
5	Metering and billing credibility – postpaid	One Billing Cycle
5.1	Metering and billing credibility – prepaid	One Quarter
6	Customer care promptness	One Quarter
6.1	- Processing closure request	One Quarter
7	Response time to customer	One Quarter
7.1	- While call is getting connected and answered	One Quarter
7.2	- While call is answered by operator (voice to voice) within 90 seconds	One Quarter
8	Time taken to refund of deposits after closure	One Quarter

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1.6 SAMPLING METHODOLOGY

- As per the sampling methodology prescribed by TRAI, all exchanges over 10% of SDCA or 10 SDCA whichever is more in a licensed service area should be selected for the purpose of audit, live calling and live measurement.
- Apart from BSNL, for other operators all the exchanges present in the circle have been covered for all operators during the audit.

SSA	SDCC	SSA	SDCA
BASTAR	JAGDALPUR	BALAGHAT	BALAGHAT
BASTAR	KANKER	BETUL	BETUL
BASTAR	KONDAGAON	BHOPAL	SEHORE
BASTAR	SUKMA	CHHATARPUR	TIKAMGARH
BILASPUR	BILASPUR	CHHINDWARA	PANDHURNA
BILASPUR	KORBA	DAMOH	DAMOH
DURG	DURG	GUNA	ASHOK NAGAR
DURG	RAJNANDGAON	GWALIOR	DATIA
RAIGARH	RAIGARH	HOSHANGABAD	ITARSI
RAIPUR	BHATAPARA	INDORE	INDORE
RAIPUR	RAIPUR	JABALPUR	SIHORA
SURGUJA	AMBIKAPUR	KHARGONE	BARWANI
RATLAM	RATLAM	MANDLA	NAINPUR
REWA	REWA	MANDSAUR	NEEMUCH
SAGAR	BINA	MORENA	MORENA
SATNA	AMARPATAN	PANNA	AJAIGARH
SHAJAPUR	SHUJALPUR	RAISEN	BARELI
UJJAIN	MAHIDPUR	RAJGARH	SARANGPUR
VIDISHA	VIDISHA		

1.7 COLOUR CODE TO READ THE REPORT

Not Meeting the benchmark

2   EXECUTIVE SUMMARY

The objective assessment of Quality of Service (QoS) carried out by IMRB gives an insight into the overall performance of various operators in the MPCG circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

2.1   PMR (PERFORMANCE MONITORING REPORT) DATA – JFM'16

Parameters	Benchmarks	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Faults incidences (No. of faults/100 Subs./month) - averaged for the quarter	≤7	6.47%	4.62%	0.26%	1.20%	3.24%
% of faults repaired by next working day	≥ 85% (Urban)	88.20%	79.00%	100.00%	100.00%	100.00%
% of faults repaired within 5 days	100% (Urban)	100.00%	100.00%	100.00%	100.00%	100.00%
Percentage of faults repaired by next working day during the quarter	≥ 75% (Rural)	NA	67.00%	NA	NA	NA
Percentage of faults repaired within 7 days during the quarter	100% (Rural)	NA	100.00%	NA	NA	NA
Faults pending for> 3days and ≤7 days	Rent rebate of 7 days	NA	NA	NA	NA	NA
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	NA	NA	NA	NA	NA
Faults pending for > 15 days	Rent rebate of 1 month	NA	NA	NA	NA	NA
Mean Time to Repair (MTTR)	≤ 10 Hrs	5.00	8.00	4.22	4.72	1.93
No. of POIs with congestion > 0.5%	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Metering and billing credibility - Number of bills disputed during the quarter	≤ 0.1%	0.05%	1.51%	0.01%	0.05%	0.04%
Resolution of billing complaints within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%
Percentage complaints resolved within 6 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%
Closure within 7 days	100%	100.00%	95.35%	100.00%	100.00%	100.00%
Refund of deposits within 60 days of closure of service	100%	99.73%	100.00%	100.00%	100.00%	100.00%
Response time to customer for assistance	Benchmarks	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
% age calls getting connected and answered	≥ 95%	100.00%	NDR	97.38%	90.41%	100.00%
Percentage of calls answered by the operators (voice to voice) within 90 seconds	≥ 95%	73.33%	NDR	96.70%	78.18%	100.00%

NA: Parameters not applicable for the operators.

2.1.1   FAULT INCIDENCE / CLEARANCE STATISTICS

BSNL failed to meet the benchmark for fault repairs within next working days in urban and rural area.

All operators met the benchmark for rent rebate parameters. Rent rebate not applicable as all faults were repaired within stipulated time.

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2.1.2 POI (POINT OF INTERCONNECTION) CONGESTION

All operators met the benchmark with 0% POIs with congestion.

2.1.3 METERING AND BILLING CREDIBILITY

BSNL failed to meet the benchmark for metering and billing credibility of number of bill disputed during the quarter.

2.1.4 RESOLUTION OF BILLING COMPLAINTS

All operators met the benchmark for resolution of billing complaints within 4 weeks and within 6 weeks.

2.1.5 PERIOD OF APPLYING CREDIT/ WAIVER

All operators met the benchmark for the parameter.

2.1.6 CLOSURE WITHIN 7 DAYS

BSNL failed to meet the benchmark for the parameter.

2.1.7 REFUND OF DEPOSIT WITHIN 60 DAYS FROM CLOSURE

Airtel failed to meet the benchmark for the parameter refund of deposit within 60 days from closure.

2.1.8 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

BSNL did not provide the data during the audit.

TTL failed to meet the TRAI benchmark in terms of number of IVR calls being connected and answered.

Airtel and TTL failed to meet the benchmark of 95% of voice to voice calls answered within stipulated time of 90 seconds.

2.2 3 DAY LIVE MEASUREMENT

Parameters	Benchmarks	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
POI Congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

Let us now review the various parameters involved during live measurement.

2.2.1 POI (POINT OF INTERCONNECTION) CONGESTION

All operators met the benchmark with 0% POIs with congestion.

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2.3 LIVE CALLING

Parameters	Benchmarks	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Fault Repair/ Clearance						
% of faults repaired by next working day	≥ 85% (Urban)	100.00%	78.00%	90.00%	94.00%	100.00%
Percentage cases where faults were repaired by next working day	≥ 75% (Rural)	NA	68.00%	NA	NA	NA
% of faults repaired within 5 days	100% (Urban)	100.00%	100.00%	100.00%	100.00%	100.00%
Percentage cases where faults were repaired within 7 days	100% (Rural)	NA	100.00%	NA	NA	NA
Resolution of billing complaints						
Resolution of billing complaints within 4 weeks	≥ 98%	100.00%	87.00%	100.00%	100.00%	100.00%
Percentage complaints resolved within 6 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%
Response time to customer for assistance						
% age calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	95.00%
% age call answered by operator in 90 seconds	≥ 95%	98.00%	96.00%	91.00%	89.00%	99.00%
Level 1 Services						
% age calls made to Level 1 services getting answered	≥ 90%	100.00%	92.00%	98.33%	91.67%	100.00%

NA- Not Applicable

2.3.1 FAULTS REPAIR/ CLEARANCE

During live calling, BSNL failed to meet benchmark for fault repair by next day in urban as well as rural area.

2.3.2 RESOLUTION OF BILLING COMPLAINTS

During live calling, it was observed that BSNL failed to meet the benchmark of resolving complaints within 4 weeks, however all operators met the benchmark within 6 weeks.

2.3.3 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

During live calling, it was observed that all operators met the benchmark of 95% IVR calls getting connected and answered.

RTL and TTL failed to meet the benchmark of 95% calls getting answered (voice to voice) within 90 seconds.

2.3.4 LEVEL 1 SERVICES

All operators met the benchmark for Level 1 services. The category 1 (restricted) services were tested from different SDCAs.

It has been observed that a number of Category-I (i.e. mandatory) services were not being operated by the operators.

Detailed Level 1 Calling is given in section 5.6.1

3   CRITICAL FINDINGS - JFM'16

Fault Incidence / Clearance Statistics

- BSNL failed to meet the benchmark for fault repairs within next working days in urban and rural area.

  All operators met the benchmark for rent rebate parameters. Rent rebate not applicable as all faults were repaired within stipulated time.

Metering and Billing Credibility

- BSNL failed to meet the benchmark for metering and billing credibility of number of bill disputed during the quarter.

Closure within 7 days

- BSNL failed to meet the benchmark for the parameter.

Refund of deposit within 60 days from closure

- Airtel failed to meet the benchmark for the parameter refund of deposit within 60 days from closure.

Response time to customer for assistance

- BSNL did not provide the data during the audit.
- TTL failed to meet the TRAI benchmark in terms of number of IVR calls being connected and answered.
- Airtel and TTL failed to meet the benchmark of 95% of voice to voice calls answered within stipulated time of 90 seconds.

Live Calling

Faults Repair/ Clearance

- During live calling, BSNL failed to meet benchmark for fault repair by next day in urban as well as rural area.

Resolution of billing complaints

- During live calling, it was observed that BSNL failed to meet the benchmark of resolving complaints within 4 weeks, however all operators met the benchmark within 6 weeks.

Response time to customer for assistance

- During live calling, it was observed that all operators met the benchmark of 95% IVR calls getting connected and answered.
- RTL and TTL failed to meet the benchmark of 95% calls getting answered (voice to voice) within 90 seconds.

Level 1 Services

- All operators met the benchmark for Level 1 services. The category 1 (restricted) services were tested from different SDCAs.

4 PARAMETER EXPLANATION AND DETAILED FINDINGS - COMPARISON BETWEEN PMR AND LIVE CALLING/ MEASUREMENT DATA

4.1 FAULT INCIDENCE/ CLEARANCE RELATED SERVICES

4.1.1 PARAMETER EXPLANATION

4.1.1.1 DEFINITION

Fault Incidence: This parameter quantifies the number of faults registered per 100 subscribers/ per month for a wireline service provider in a quarter.

Fault Clearance/Repair: This parameter quantifies the number of faults repaired within a stipulated period of time (within a day, within 5 days – urban, within 7 days – rural) in the quarter

Mean Time to Repair (MTTR): It is the average of total time taken to repair for all faults reported in a quarter

4.1.1.2 AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to number of fault received and also number of faults cleared at the service provider's level in the following time frames:-

- ✥ Number of faults cleared within 24 hours (Urban)
- ✥ Number of cleared in more than 1 day but less than 5 days (Urban)
- ✥ Number of cleared in more than 5 days but less than 7 days (Urban)
- ✥ Number of cleared in more than 7 days but less than 15 days (Urban)
- ✥ Number of cleared in more than 15 days (Urban)

The mean time to repair (in hours) is also calculated by averaging the total time of repair for each customer.

Live calling: -

- ✥ Live calling was done to verify the following
  - o Fault repair by next working day - for both Urban Exchanges
  - o Fault repair within 5 working days – Urban Exchanges
- ✥ Auditors ensured that the operator provided a list of all the subscribers who reported Faults in one month prior to IMRB auditor visit
- ✥ Calls are made to up to 10% or 100 complainants, whichever is less, per service provider or in case of BSNL, if there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.

✎ Auditors checked and recorded whether the fault was corrected within the timeframes as mentioned in the benchmark

4.1.1.3 COMPUTATIONAL METHODOLOGY

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed for calculating fault related parameters.

Fault Incidence:

Fault incidences – No. of faults/100 subscriber/month =

$$\text{Fault incidences} = \frac{\text{Total number of faults in the Quarter (3 months)}}{\text{Total No. of DELs at the end of the Quarter}} \times \frac{100}{3}$$

Here, DEL or Direct Exchange Line would be the subscribers of wireline services.

MTTR (Mean Time to Repair):

$$\text{Mean Time to Repair} = \frac{\text{sum of duration of each repair time in hours for all the fault incidences in a Quarter (3 months)}}{\text{Total number of fault incidences in a Quarter (3 months)}}$$

4.1.1.4 BENCHMARK

✎ Total number of faults registered per month: <=5 complaints per 100 subscribers

✎ Fault repair:

　○ Fault repair by next working day (Urban Exchanges): =>85%

　○ Fault repair within 5 working days (Urban Exchanges): =100%

✎ Mean Time to Repair: 10 hours

4.1.2 DETAILED FINDINGS - FAULT INCIDENCE
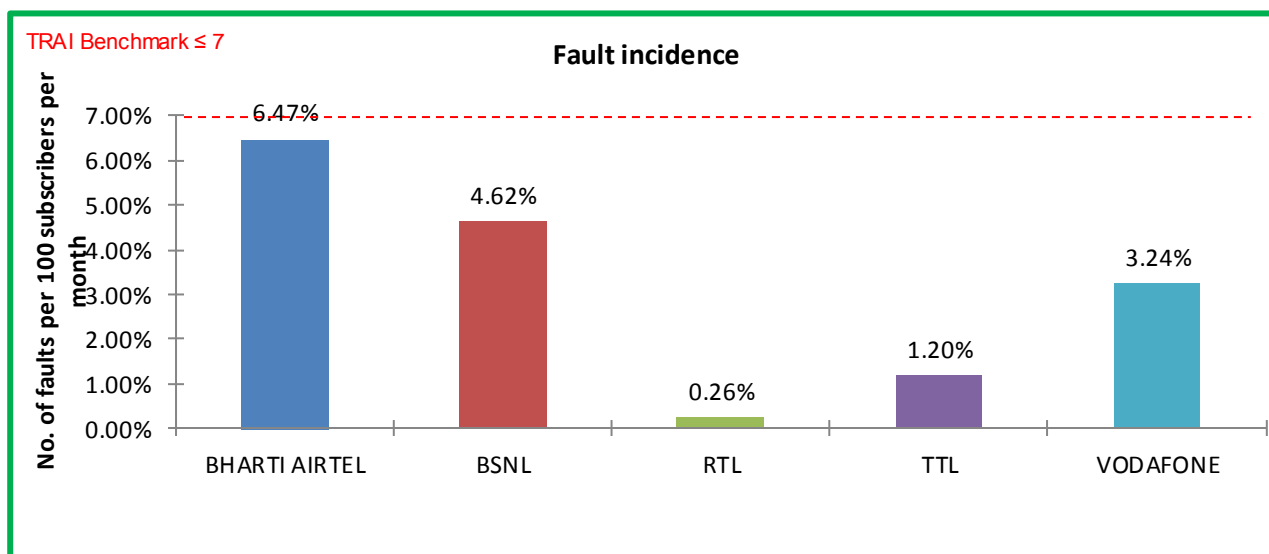
Fault incidence

TRAI Benchmark ≤ 7

Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for fault incidence

4.1.3 DETAILED FINDINGS - FAULT REPAIR BY NEXT DAY (URBAN)
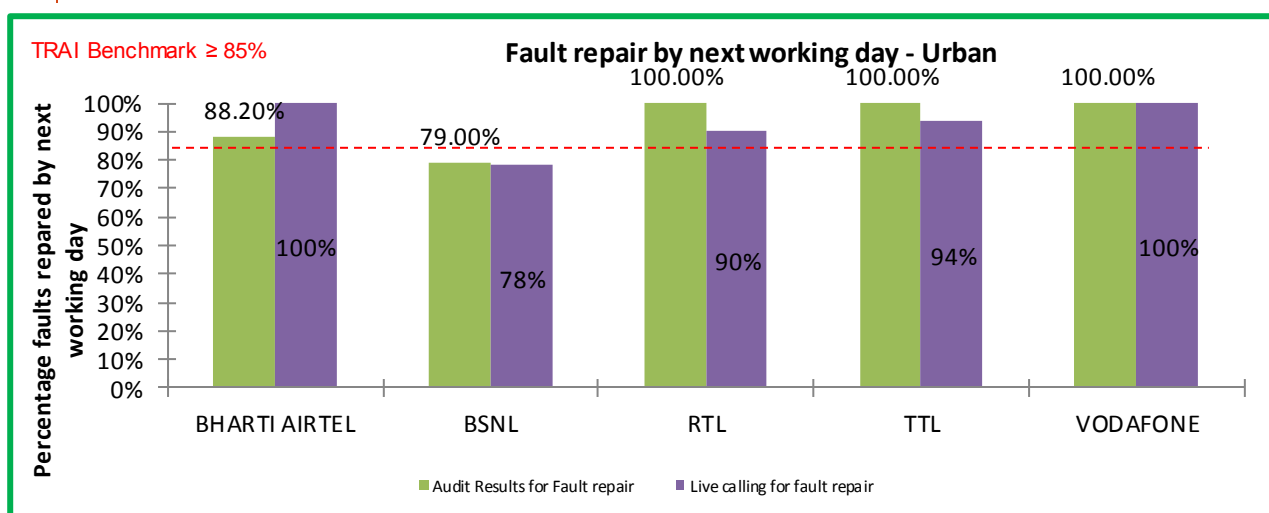
Fault repair by next working day - Urban

TRAI Benchmark ≥ 85%

Data Source: Operations and Maintenance Center (OMC) of the operators

BSNL failed to meet the benchmark of fault repair by next day during audit as well as live calling.

4.1.4 FINDINGS - FAULT REPAIR WITHIN FIVE WORKING DAYS (URBAN)
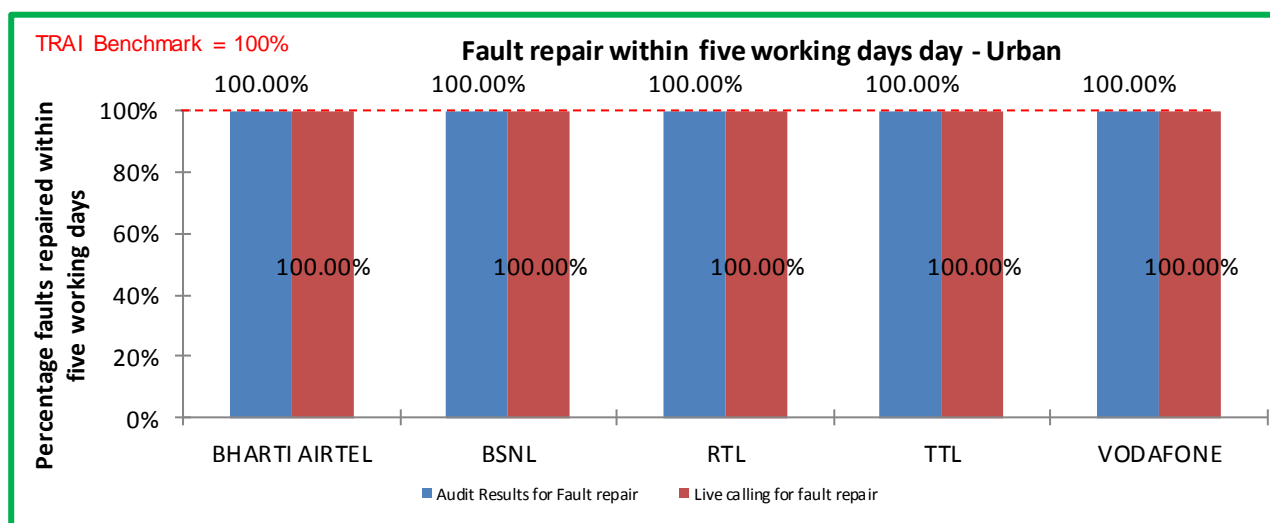
Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark of fault repair within five working days in urban areas. During live calling the performance of all the operators was good.

4.1.5 DETAILED FINDINGS - MEAN TIME TO REPAIR
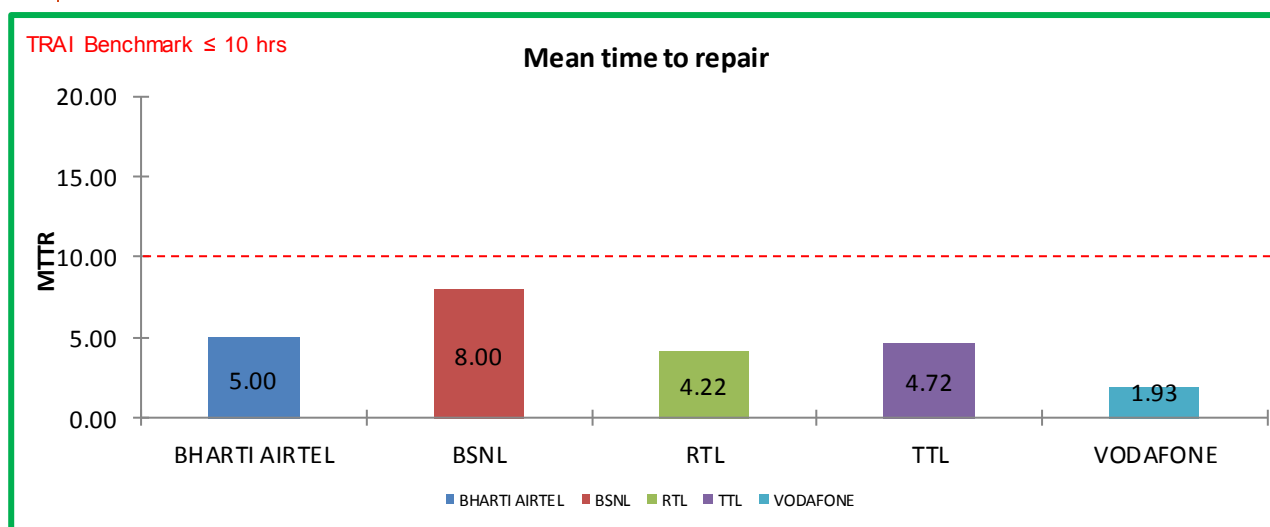
Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for MTTR.

4.2 METERING AND BILLING CREDIBILITY

4.2.1 PARAMETER EXPLANATION

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20th March, 2009 were covered. The types of billing complaints covered are listed below.

- ✆ Payments made and not credited to the subscriber account
- ✆ Payment made on time but late payment charge levied wrongly
- ✆ Double charges
- ✆ Charging for toll free services
- ✆ Local calls charged/billed as STD/ISD or vice versa
- ✆ Calls made disputed
- ✆ Credit agreed to be given in resolution of complaint, but not accounted in the bill
- ✆ Charging for services provided without consent
- ✆ Charging not as per tariff plans
- ✆ Overcharging or undercharging

In addition to the above, any billing complaint which leads to billing error, waiver, refund, credit, or any adjustment is also considered as a valid billing complaint for calculating the number of disputed bills.

4.2.1.1 AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to –

- ✆ Number of Billing complaints received at the service provider's level
- ✆ Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled.
- ✆ Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills
- ✆ Billing complaint is any of written complaint/ personal visit/ telephonic complaint related to: Excess metering/ wrong tariff scheme charged, Payment made in time but charged penalty/ not reflected in next bill, Last payment not reflected in bill, Adjustment/ waiver not done, Anything else related to bills, Toll free numbers charged etc.
- ✆ Billing complaints resolution database, with opening and closing date of complaint to identify the time taken to resolve a complaint

Live calling:

ᛘ Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically

ᛘ A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator

ᛘ Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

Benchmarks:

ᛘ 98% complaints resolved within 4 weeks, 100% complaints resolved within 6 weeks

4.2.1.2 COMPUTATIONAL METHODOLOGY – METERING AND BILLING CREDIBILITY

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed to calculate incidence of billing complaints.

$$\text{Billing complaints (\%)} = \frac{\text{total number of disputed bills X 100}}{\text{total number of bills issued during one billing cycle.}}$$

ᛘ *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated

ᛘ **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.

TRAI Benchmark: < 0.1%

4.2.1.3 METERING AND BILLING CREDIBILITY – AUDIT FINDINGS

Data Source: Billing Center of the operators

BSNL failed to meet the benchmark for the parameter.

4.2.1.4 COMPUTATIONAL METHODOLOGY – RESOLUTION OF BILLING COMPLAINTS

✍ **Calculation of Percentage resolution of billing complaints**

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) and TRAI guidelines (Received on Sep 08, 2015) was followed to calculate resolution of billing complaints.

Resolution of billing complaints within 4 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 4 weeks =

$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 4 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

Resolution of billing complaints within 6 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

o **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally. Complaints raised by the consumers to operator are only considered as part of the calculation.

o The complaints that get marked as invalid by the operator are not considered for calculation as those complaints cannot be considered as resolved by the operator.

✥ *** Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.

Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

4.2.1.5 RESOLUTION OF BILLING COMPLAINTS – AUDIT FINDINGS
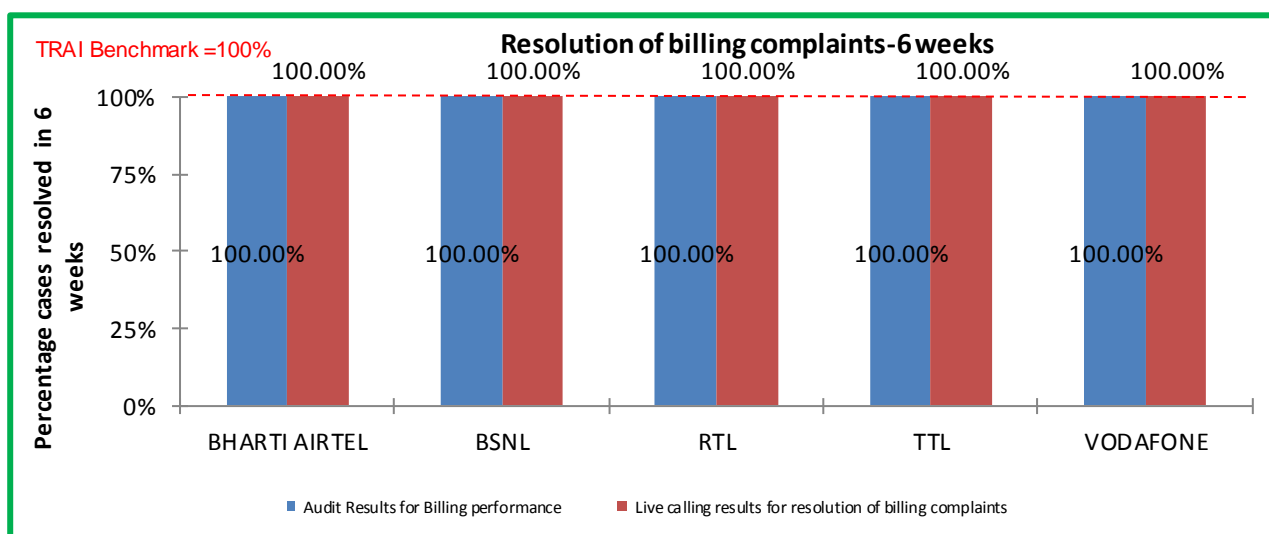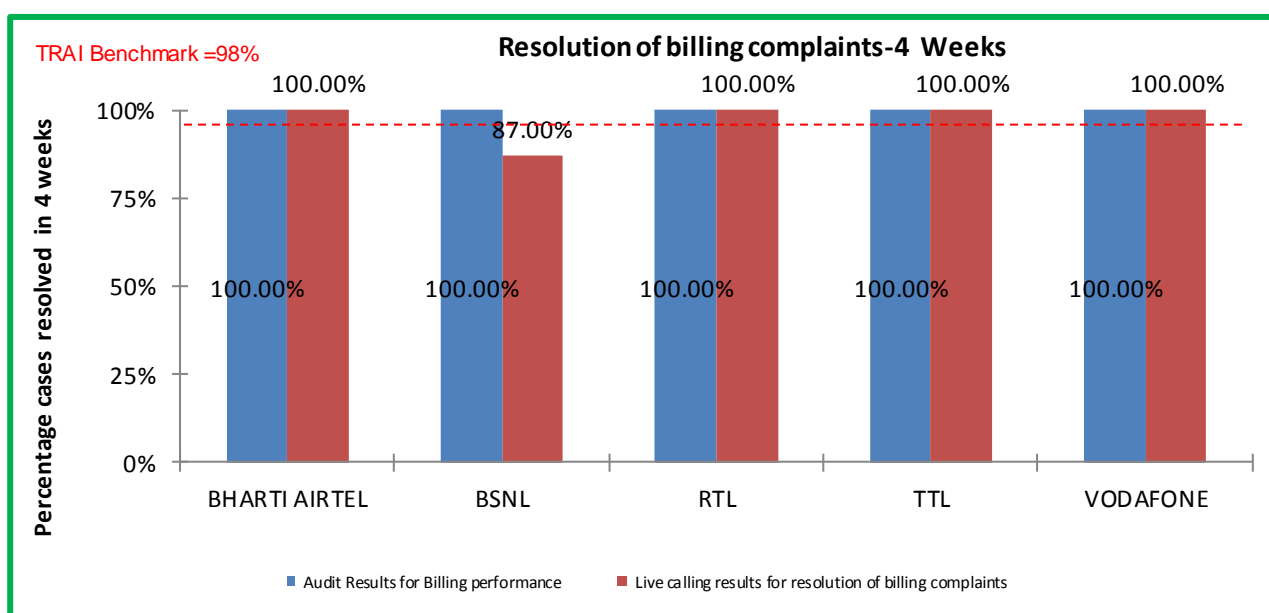
As per audit conducted, all operators met the benchmark for resolution of billing complaints within 4 weeks and within 6 weeks, while BSNL failed to meet during the live audit for resolution of billing complaints within 4 weeks.

4.2.1.6 COMPUTATION METHODOLOFY - PERIOD OF APPLYING CREDIT WAIVER

This parameter measures whether all refunds in the form of credit/ waiver/ adjustment are made within 7 days from the date of resolution of complaint.

- ⮊ Computational Methodology:
  - ↳ Period of applying credit waiver = (number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver) * 100

- ⮊ TRAI Benchmark:
  - ↳ Period of applying credit waiver within 7 days: 100%

- ⮊ Audit Procedure:
  - ↳ Operator to provide details of:-
    - ‣ Dates of applying credit waiver to all the eligible cases.
    - ‣ Dates of lodging the request for applying credit waiver for all eligible cases

4.2.1.7 PERIOD OF APPLYING CREDIT WAIVER – AUDIT FINDINGS
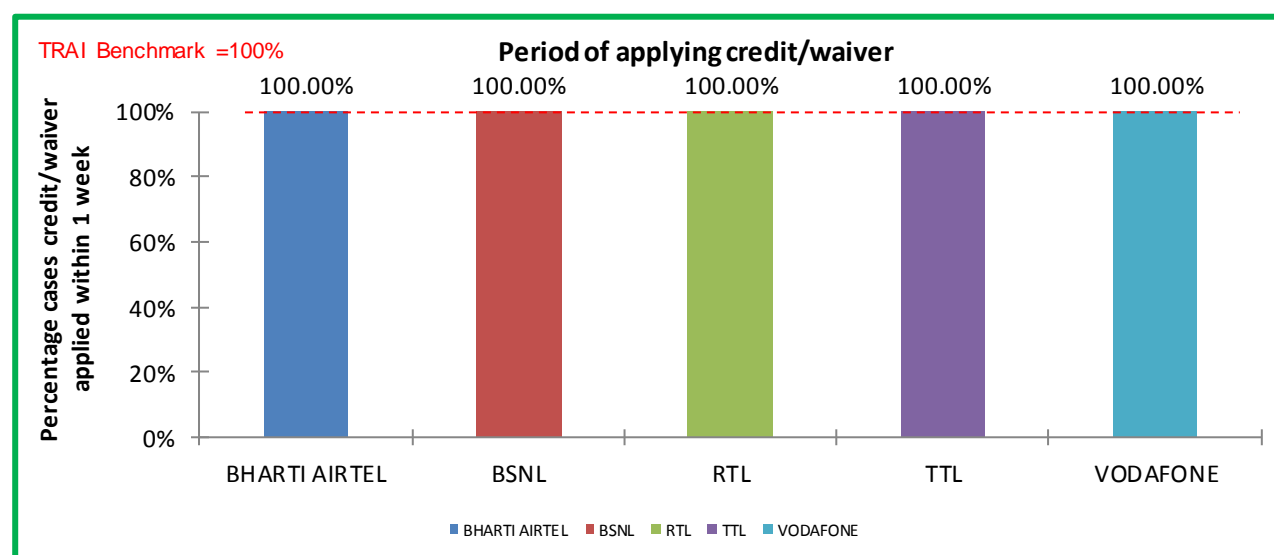
All operators met the benchmark for the parameter.

4.3 RESPONSE TIME TO CUSTOMER

4.3.1 PARAMETER EXPLANATION

Following two sub-parameters are covered for this parameter:

- Accessibility of Call Centre: The percentage of calls getting connected and answered by the call center. Not more than 5% calls shall encounter busy signal, no reply or any other failure in getting connected to the IVR.

- % age of calls answered by operators (voice to voice) within stipulated time: Not more than 5% calls shall encounter busy signal, no reply or any other failure in getting connected to the call center executive.

4.3.1.1 AUDIT PROCEDURE

- IMRB auditors collect the data for time taken to connect a customer's call both to the IVR as well as to a customer care executive.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

Live calling:

- Overall sample size was 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS.
- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

4.3.1.2 COMPUTATIONAL METHODOLOGY

- **Percentage of calls answered in a specified time = (Total no. of calls answered within that specified time / Total no. of calls dialed for a particular service)*100**

4.3.1.3 BENCHMARK

- % age of calls getting connected and answered: In 95% of the cases or more.
- % age of calls answered by operator / voice to voice) within 90 seconds: In 95% of the cases or more

4.3.2 CALLS GETTING CONNECTED AND ANSWERED

Calls getting connected and answered
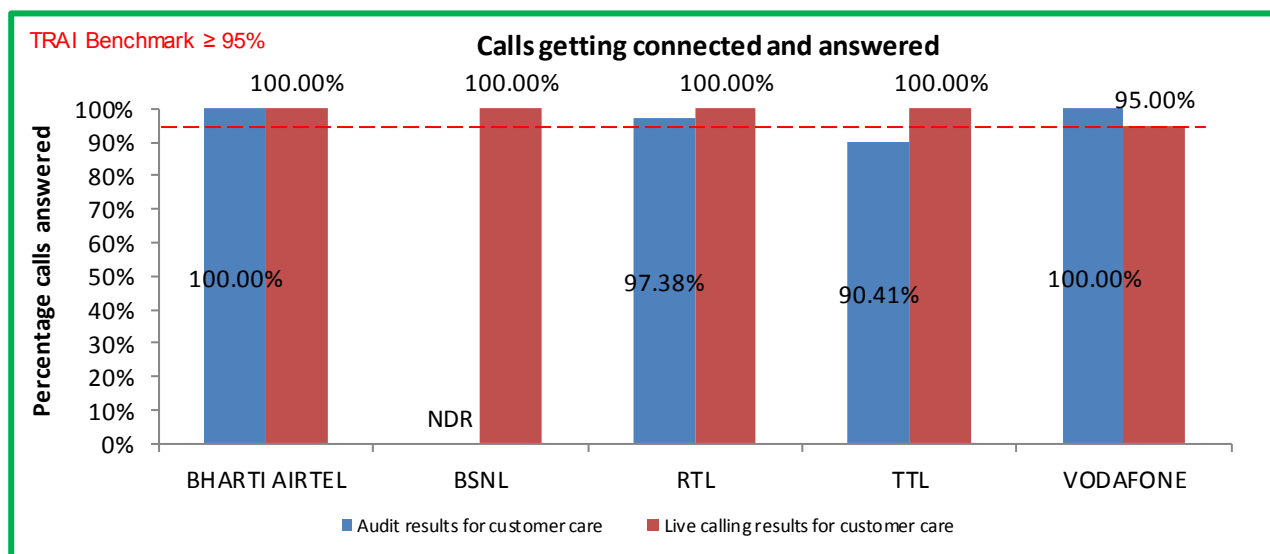
TRAI Benchmark ≥ 95%

Data Source: Customer Service Center of the operators

TTL failed to meet the TRAI benchmark in terms of number of IVR calls being connected and answered. However, during live calling, performance all operators met the benchmark level.

4.3.3 CALL ANSWERED BY OPERATOR WITHIN 90 SECONDS

Call Answered by Operator within 90 seconds

TRAI Benchmark ≥ 95%
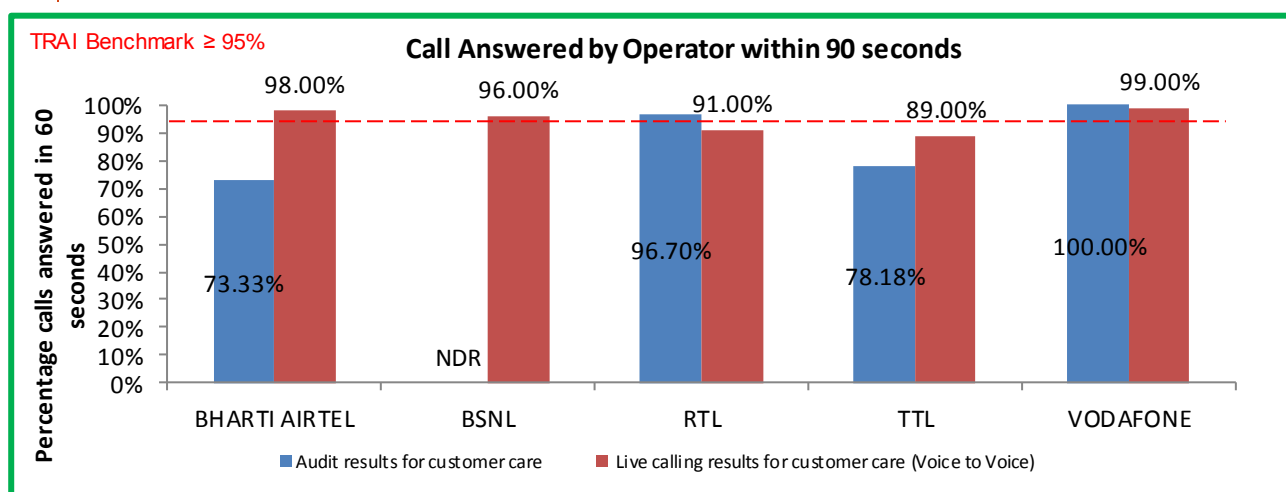
Data Source: Customer Service Center of the operators

The benchmark of 95% of voice to voice calls answered within stipulated time of 90 seconds was met by all operators except Airtel and TTL. However, during live calling it was observed that only RTL and TTL failed to meet the benchmark.

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4.4 CUSTOMER CARE PROMPTNESS

4.4.1 PARAMETER EXPLANATION

4.4.1.1 AUDIT PROCEDURE

IMRB Auditors collected and verified data pertaining to -

Processing of closure request (Following key points were taken care of while verifying the data)

- ✣ The operator includes all Requests for volunteer Permanent Closure and External (shifts to other exchanges) Shift requests received at their exchange.
- ✣ DNP (due to Non – payment) cases are excluded.
- ✣ All holidays are excluded for calculating 7 days.
- ✣ Closure requests attended in the previous months are excluded
- ✣ The period for closure starts from the time of submission of application by the subscriber.

4.4.1.2 BENCHMARK

- ✣ Processing of closure requests within 7 days = 100%

4.4.2 FINDINGS - CLOSURE REQUEST ATTENDED IN 7 DAYS
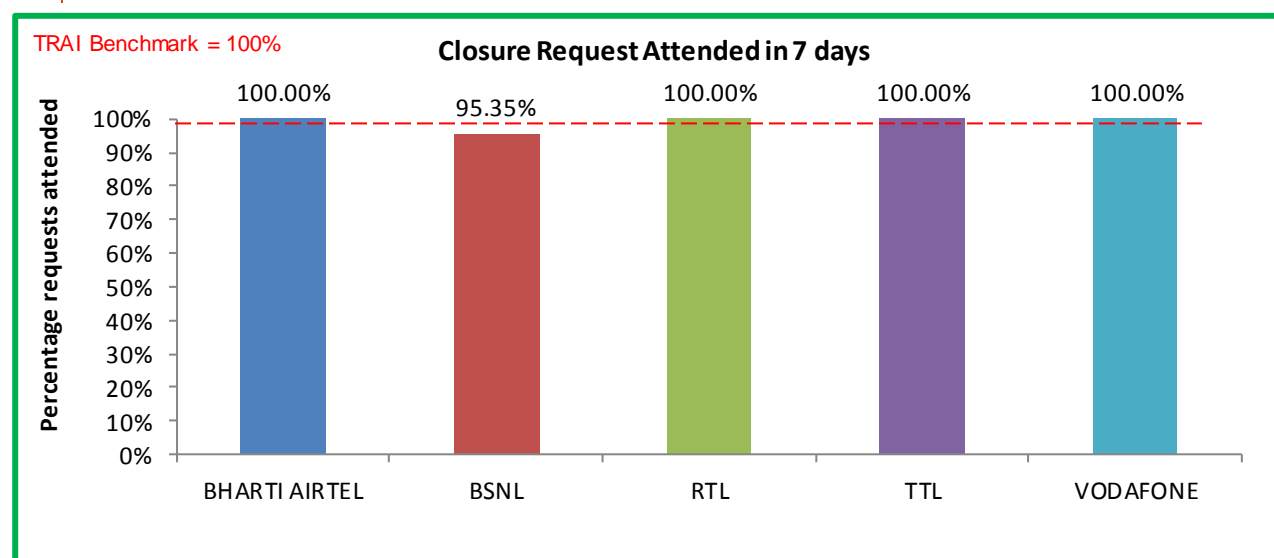
Data Source: Customer Service Center of the operators

BSNL failed to meet the benchmark for the parameter.

4.5 TIME TAKEN TO REFUND DEPOSIT AFTER CLOSURE

4.5.1 PARAMETER EXPLANATION

4.5.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to -

- ✤ Cases requiring refund of deposits after closure are to be included.
- ✤ Time taken starts from the date on which the closure is made by the service provider and ends at the date on which refund is received by the customer

4.5.1.2 COMPUTATIONAL METHODOLOGY

- ✤ **Percentage of cases where refund has been made within stipulated time = (Total no. of cases where refund was made within stipulated time/ Total no. of cases requiring refunds)*100**

4.5.1.3 BENCHMARK

- ✤ Time taken to refund = 100% within 60 days

4.5.2 FINDINGS - REFUND OF DEPOSIT AFTER CLOSURE WITHIN 60 DAYS
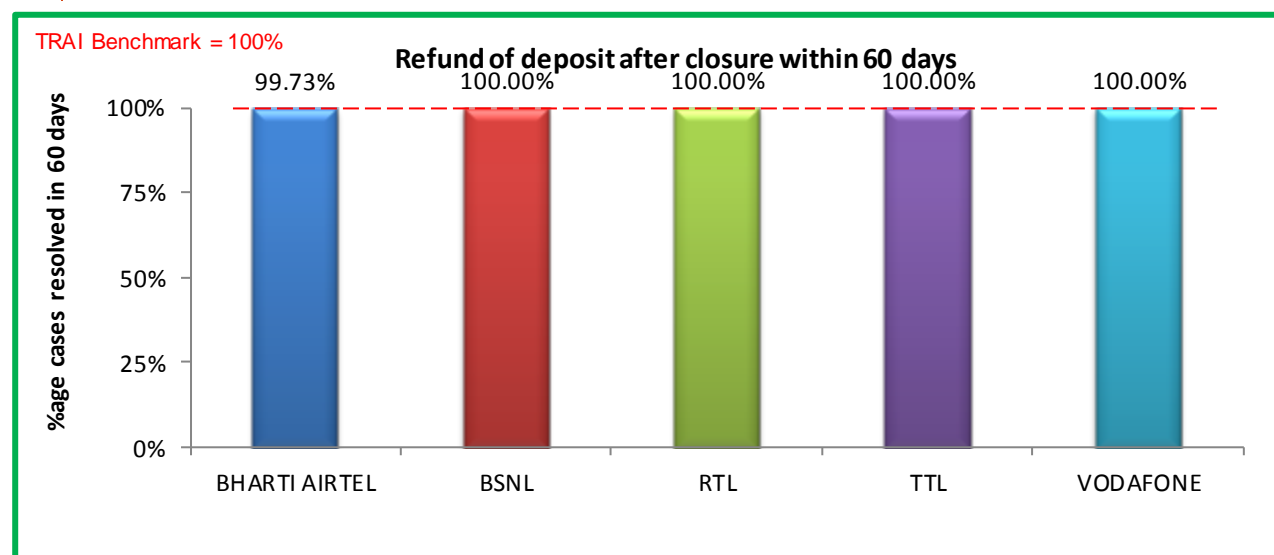
Data Source: Customer Service Center of the operators

Airtel failed to meet the benchmark for the parameter.

5 ANNEXURE – JFM'16

5.1 FAULT INCIDENCE / CLEARANCE STATISTIC

Fault Incidence / Clearance Statistics						
Audit Results for Fault repair						
Fault incidences	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**TTL**	**VODAFONE**
Faults incidences (Urban)	≤ 7	6.47%	4.62%	0.26%	1.20%	3.24%
Fault repair (Urban areas)	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**TTL**	**VODAFONE**
Total No. of faults registered during the quarter		2456	1205	173	114	345
No. of faults repaired by next working day during the quarter		2166	952	173	114	345
Percentage of faults repaired by next working day during the quarter	≥ 85%	88.20%	79.00%	100.00%	100.00%	100.00%
No. of faults repaired within 5 days during the quarter		2456	1205	173	114	345
Percentage of faults repaired within 5 days during the quarter	100%	100.00%	100.00%	100.00%	100.00%	100.00%
Fault repair (Rural & Hilly areas)	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**TTL**	**VODAFONE**
Total No. of faults registered during the quarter		NA	100	NA	NA	NA
No. of faults repaired by next working day during the quarter		NA	67	NA	NA	NA
Percentage of faults repaired by next working day during the quarter	≥ 75%	NA	67.00%	NA	NA	NA
No. of faults repaired within 7 days during the quarter		NA	100	NA	NA	NA
Percentage of faults repaired within 7 days during the quarter	100%	NA	100.00%	NA	NA	NA

Rent rebate	Benchmark	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Percentage of cases where rent rebate for 7 days was given	100%	NA	NA	NA	NA	NA
Percentage of cases where rent rebate for 15 days was given	100%	NA	NA	NA	NA	NA
Percentage of cases where rent rebate for 30 days was given	100%	NA	NA	NA	NA	NA
MTTR (Urban + Rural)	Benchmark	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Mean time taken to repair the fault in hours	≤ 10 Hrs	5.00	8.00	4.22	4.72	1.93

Data Source: Operations and Maintenance Center (OMC) of the operators

Live calling for fault repair						
Urban area	Benchmark	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Total Number of calls made		100	100	50	50	100
Number of cases where faults were repaired by next working day		100	78	45	47	100
Percentage cases where faults were repaired by next working day	≥ 85%	100%	78%	90%	94%	100%
Number of cases where faults were repaired within 5 days		100	100	50	50	100
Percentage cases where faults were repaired within 5 days	100%	100.00%	100.00%	100.00%	100.00%	100.00%
Fault Repair (Rural & Hilly areas)	Benchmark	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Total Number of calls made		NA	50	NA	NA	NA
Number of cases where fauls were repaired by next working day		NA	34	NA	NA	NA
Percentage cases where faults were repaired by next working day	≥ 75%	NA	68.00%	NA	NA	NA
Number of cases where faults were repaired within 7 days		NA	50	NA	NA	NA
Percentage cases where faults were repaired within 7 days	100%	NA	100.00%	NA	NA	NA

Data Source: Live calls made by auditors from operator's network

NA: Operators does not have network presence in rural and hilly areas.

5.2 POI CONGESTION

POI Congestion						
Audit Results for POI Congestion - Consolidated						
POI congestion	Benchmark	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Traffic failed on all POI's (Average of 3 months)	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live measurement results for POI congestion						
POI congestion	Benchmark	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Traffic failed on all POI's	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

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5.3 METERING AND BILLING CREDIBILITY

Metering and Billing credibility						
Audit Results for Billing performance						
Billing Performance	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**TTL**	**VODAFONE**
Billing diputes						
Total bills generated during the quarter		776662	5683	15498	2214	4562
Total number of bills disputed		426	86	2	1	2
Percentage bills disputed (Average of 3 billing cycles)	≤ 0.1%	0.05%	1.51%	0.01%	0.05%	0.04%
Resolution of billing complaints						
Total number of billing/charging complaints		1251	188	2	1	2
Total complaints resolved in 4 weeks from date of receipt		1251	172	2	1	2
Percentage complaints resolved within 4 weeks of date of receipt	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%
Total complaints resolved in 6 weeks from date of receipt		1251	188	2	1	2
Percentage complaints resolved within 6 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver						
No. of complaints resolved in favour of the customer during the quarter		426	17	2	1	2
No. of complaints disposed on account of not considered as valid complaints		426	17	2	1	2
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

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Live calling results for resolution of billing complaints						
Resolution of billing complaints	Benchmark	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Total Number of calls made		100	100	2	1	2
Number of cases resolved in 4 weeks		100	87	2	1	2
Percentage cases resolved in 4 weeks	≥ 98%	100.00%	87.00%	100.00%	100.00%	100.00%
Total complaints resolved in 6 weeks from date of receipt		100	100	2	1	2
Percentage complaints resolved within 6 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

5.4 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

Audit results for customer care						
Customer Care Assessment	Benchmark	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Total no. of call attempts to call centre / customer care nos.		549479	NDR	34317	417	950
No. of calls connected and answered successfully to call centre / customer care nos.		549479	NDR	33419	377	950
Percentage of calls getting connected and answered electronically	≥ 95%	100.00%	NDR	97.38%	90.41%	100.00%
Audit results for customer care (voice to voice)						
Total no. of call attempts to call centre / customer care (voice to voice)		71362	NDR	34317	417	949
No. of calls connected and answered successfully to call centre / customer care nos.		52331	NDR	33183	326	949
Percentage of calls answered by the operators (voice to voice) within 90 seconds (Avg of 3 months)	≥ 95%	73.33%	NDR	96.70%	78.18%	100.00%

Live calling results for customer care						
Customer Care Assessment	Benchmark	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Total Number of calls made		100	100	100	100	100
Total Number of calls getting connected and answered		100	100	100	100	95
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	95.00%
Live calling results for customer care (Voice to Voice)						
Customer Care Assessment	Benchmark	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Total Number of calls received		100	100	100	100	100
Total Number of calls answered within 90 seconds		98	96	91	89	99
Percentage calls answered within 90 seconds	≥ 95%	98.00%	96.00%	91.00%	89.00%	99.00%

Data Source: Customer Service Center of the operators

5.5 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits						
Refund	Benchmark	BHARTI AIRTEL	BSNL	RTL	TTL	VODAFONE
Total number of cases requiring refund of deposits		365	102	5	0	0
Total number of cases where refund was made within 60 days		364	102	5	0	0
Percentage cases in which refund was receive within 60 days	100%	99.73%	100.00%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

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5.6 LIVE CALLING FOR LEVEL 1 SERVICES

Live calling for level 1 services						
Level 1 services	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**TTL**	**VODAFONE**
Total no. of calls made		300	300	300	300	300
Calls answered		300	276	295	275	300
Percentage of Calls answered	≥ 90%	100.00%	92.00%	98.33%	91.67%	100.00%

Data Source: Live calling conducted by auditors from operator's network

5.6.1 DETAILED LIVE CALLS MADE FOR LEVEL 1 SERVICES

Airtel					
Level 1 Number	**Type of Service**	**Working**	**Not Working**	**Calls Made**	**Calls Connected**
100	Police	Y		18	16
101	Fire	Y		18	16
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpline for Passengers	Y		17	16
1412	Public Road Transport Utility Service	Y		18	16
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service		N		

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Number	Service	Y	N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		18	16
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		17	16
1071	Air Accident Helpline	Y		18	15
1072	Rail Accident Helpline	Y		17	15
1073	Road Accident Helpline	Y		18	16
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)	Y		18	16
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	16
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling	Y		18	16
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		18	16
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		17	16
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		18	16
155304	Municipal Corporations		N		
155214	Labour Helpline		N		

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11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		17	16
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		18	16
BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	22
101	Fire		N		
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		27	21
138	All India helpline for Passengers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		27	22
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		27	22
1071	Air Accident Helpline		N		

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1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)	Y		28	22
10121	Women Helpline	Y		27	21
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		27	21
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		28	22
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		27	21
112012	National Do Not Call Registry	Y		27	21
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		28	22
RCL					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		25	24
101	Fire	Y		25	24
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India helpline for Passengers	Y		25	24
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		25	25
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		25	24
1071	Air Accident Helpline	Y		25	24
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)		N		
10121	Women Helpline	Y		25	24

Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		25	24
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		25	24
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		25	
155304	Municipal Corporations	Y		25	
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		25	24
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
TTL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	24
101	Fire	Y		28	24
102	Ambulance		N		
104	Health Information Helpline		N		

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108	Emergency and Disaster Management Helpline		N		
138	All India helpline for Passengers	Y		28	24
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		27	23
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		27	24
1071	Air Accident Helpline	Y		28	24
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		27	24
1077	Control Room for District Collector		N		
10120	Call Alert (Crime Branch)		N		
10121	Women Helpline	Y		27	24
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		27	24
10741	Pollution Control Board		N		

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Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		27	24
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		27	24
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		30	20
101	Fire	Y		30	20
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpline for Passengers	Y		30	20
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		30	19
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom		N		

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	Consumer Grievance Redressal Helpline'				
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		30	20
1071	Air Accident Helpline	Y		30	20
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		30	19
10120	Call Alert (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		30	20
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		

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11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		30	20
11212	Complaint of Electricity		N		
11216	Drinking Water Supply	Y		30	20
11250	Election Commission of India		N		

| WEST ZONE | TRAI AUDIT BROADBAND REPORT – MPCG - AUDIT OF JFM QUARTER, 2016 |

Prepared By -

Prepared For-

TABLE OF CONTENTS

1. INTRODUCTION

1.1 About TRAI

TRAI's mission is to create and nurture conditions for growth of telecommunications in the country in a manner and at a pace that will enable India to play a leading role in the emerging global information society. One of the main objectives of TRAI is to provide a fair and transparent policy environment which promotes a level playing field and facilitates fair competition.

In pursuance of above objective, TRAI has been issuing regulations, order and directives to deal with the issues or complaints raised by the operators as well as the consumers. These regulations, order and directives have helped to nurture the growth of multi operator multi service - an open competitive market from a government owned monopoly. Also, the directions, orders and regulations issued cover a wide range of subjects including tariff, interconnection and quality of service as well as governance of the Authority.

TRAI initiated a regulation - The Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009) dated 20[th] March, 2009, the "Standards of Quality of Service for Wireless Data Services Regulations, 2012 dated 4th December 2012, and the "Quality of Service of Broadband Service Regulations", 2006 (11 of 2006) dated 6th October, 2006 that provide the benchmarks for the parameters on customer perception of service to be achieved by service provider.

In order to assess the above regulations, TRAI has commissioned a third party agency to conduct the audit of the service providers and check the performance of the operators on the various benchmarks set by Telecom Regulatory Authority of India (TRAI).
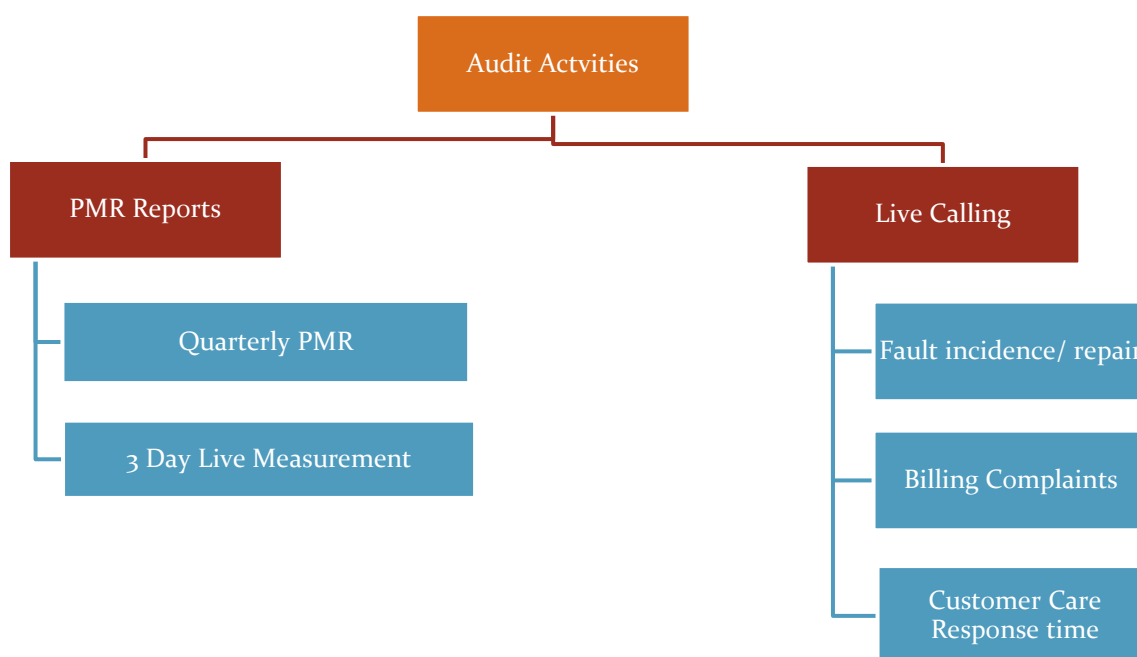
1.2 OBJECTIVES

The primary objective of the Audit module is to:

✤ Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).

1.3   COVERAGE

The broadband audit was conducted in MPCG circle. For BSNL, a geographical spread among the SDCAs and POPs was maintained. For other operators, the audit was conducted for all SDCAs at overall level.

Image Source: Internet

1.4   AUDIT PROCESS AND OPERATOR SELECTION

As per TRAI guidelines, the Broadband Audit for a circle is conducted once every year.

- The operators have been assimilated as per TRAI guidelines given in QoS tender document 2015 and latest list of licensees (with more than 10,000 subscriber in their LSAs) provided by TRAI.

- To conduct the audit, IMRB auditors contacted the broadband operators given in the list below to conduct the audit in MPCG circle for the JFM 2016 quarter.
  - o   Airtel
  - o   BSNL
  - o   Broadband Pacenet
  - o   Reliance
  - o   TTL
  - o   Tickona

- The PMR was generated from the raw data pertaining to Jan, Feb and Mar 2016 (JFM'16), which was extracted by auditor from the operator's systems during the audit conducted in the month of Jan 2016.

- Live calling activity was carried out during the period of Mar 2016. The data considered for live calling was for the month prior to the live calling month. In this round of audit, Feb 2016 data was considered for live calling for all operators.

- 3 day live measurement activity was carried out on working days during the month of Mar 2016. The data for the last three working days from the date of live measurement was extracted from operator's systems and audited by the auditors.

1.5   FRAMEWORK USED

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                         ┌─────────────────────┐
                         │   Audit Actvities   │
                         └─────────────────────┘
                  ┌────────────────┴────────────────┐
         ┌─────────────────┐              ┌─────────────────┐
         │   PMR Reports   │              │   Live Calling  │
         └─────────────────┘              └─────────────────┘
                  │                                 │
         ┌─────────────────┐              ┌─────────────────────┐
         │  Quarterly PMR  │              │ Fault incidence/repair │
         └─────────────────┘              └─────────────────────┘
                  │                                 │
         ┌─────────────────────┐          ┌─────────────────────┐
         │ 3 Day Live Measurement │        │  Billing Complaints │
         └─────────────────────┘          └─────────────────────┘
                                                    │
                                          ┌─────────────────────┐
                                          │   Customer Care     │
                                          │   Response time     │
                                          └─────────────────────┘
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1.5.1   PMR REPORTS - SIGNIFICANCE AND METHODOLOGY

The significance of PMR or Performance Monitoring Reports is to assess the various Quality of Service (QoS) parameters involved in the Broadband services, which indicate the overall health of service for an operator.

To verify the QoS performance of the operators, TRAI has appointed IMRB as their auditor in West Zone to conduct QoS audit of operators. The steps involved in the audit have been given below.

The IMRB auditors inform the operators about the audit schedule in advance. Accordingly, the auditors visit the operator premises to conduct the audit.

During TRAI audit, raw data is extracted from the operator's server/ NOC/ exchange/ OMC/ customer service center/ billing center etc. by the IMRB auditor with assistance from the operator personnel in order to generate PMR reports (Network/ Fault/ Billing /Customer Service).

All the calculations are done by IMRB auditors to generate a new PMR report from that raw data.

The newly generated PMR reports are then taken in hard copy, duly signed by the competent authority of operators. IMRB auditors also sign the same report.
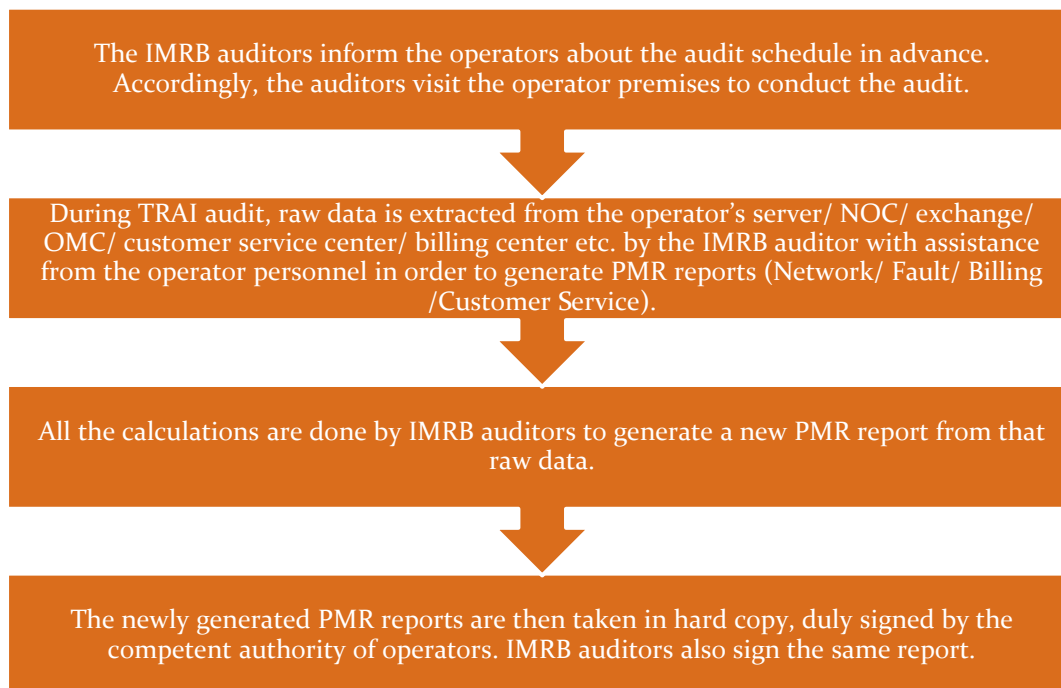
The raw data extracted is then used to generate PMR reports in the following formats.

- ✦ Quarterly PMR
- ✦ 3 Day Live Measurement Data

Let us understand these formats in detail.

This report has been prepared from the raw data extracted for the period of JFM'16during Mar 2016.

1.5.1.1   QUARTERLY PMR REPORT – PARAMETERS REVIEWED

The main purpose of quarterly PMR report is to verify the following key QoS parameters on quarterly basis as per the methodology stated above in section 1.4.

- Service Provisioning
- Fault incidence/clearance related statistic
- Billing Performance (Metering and billing credibility)
- Resolution of billing complaints
- Response time to customer for assistance
- Bandwidth Utilization
- Broadband download speed
- Service Availability/ Uptime
- Network Latency/ Packet Loss

1.5.1.2   3 DAY LIVE MEASUREMENT - SIGNIFICANCE AND METHODOLOGY

The main purpose of 3 day live measurement is to evaluate the following parameters on intraday basis. The auditors visit the sample exchanges (in case of BSNL) and main exchanges (in case of other operators) to collect the 3 day live data for the following parameters.

- Bandwidth Utilization
- Broadband download speed
- Service Availability/ Uptime
- Network Latency/ Packet Loss

While the quarterly PMR report provides an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the above given parameters. All the calculations are then done on the basis of that raw data of 3 days.

1.5.1.3   TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per Quality of Service of Broadband Service Regulations", 2006 (11 of 2006), Time Consistent Busy Hour" or "TCBH" means the one hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration and such Time Consistent Busy Hour shall be established on the basis of analysis of traffic data for a period of ninety days.

Step by step procedure to identify TCBH for an operator:

Day wise raw data is fetched from the operator's OMCR and kept in a readable format (preferably MS-Excel). Data for a period of 90 days is used to identify TCBH.

The 90 day period is decided upon the basis of month of audit. For example, for audit of Mar 2016, the 90 day period data used to identify TCBH would be the data of, Jan, Feb & Mar 2016

For each day, the hour in which average traffic of the resource group concerned is greatest for the day will be the 'Busy Hour' for the operator.

The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as TCBH for the operator

During audit, the auditors identified following TCBHs from the raw data collected from the operators for the quarter of JFM'16.

BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
11:00 - 12:00	18:00 - 19:00	15:00 - 16:00	19:00-20:00	19:00-20:00	18:00 - 19:00

The data for network parameters has been taken as per the TCBH identified by the auditor for the operators.

1.5.2   LIVE CALLING - SIGNIFICANCE AND METHODOLOGY

The main purpose of live calling is to verify the performance of following parameters by doing test calls to the subscribers/ specific numbers.

- Service Provisioning
- Fault incidence/clearance related statistic
- Resolution of billing complaints
- Response time to customer for assistance

The process of conducting live calling has been stated below.

The IMRB auditor visits the operator premises such as main exchanges/ OMC/ customer service center etc. to do live calling. The auditors take the raw data of service provisioning, fault repair, customer complaints (billing) from the the operator's system for the preceding month and also the list of customer service numbers to be verified through live calling

IMRB auditors then make live calls to a random sample of subscribers from the raw data provided to verify the resolution of complaints

The auditors also verify the performance of call center by calling the numbers using operator's wireline network

Let us now discuss the methodology of live calling for each parameter in detail.

1.5.2.1   SERVICE PROVISIONING

Live calling for service provisioning is done to verify the following.

- ✎ Number of connections provided in 15 days from customer request

Live Calling Process:

- ✎ Auditors request the operator to provide the database of all the subscribers who requested for a new connection in one month prior to IMRB auditor visit
- ✎ 100 Calls per service provider are made to customers or in case of BSNL, 10% or 30 per SDCA by randomly selecting from the database provided by operator
- ✎ Auditors check and record whether the connection was provided to customers within the timeframes as mentioned in the benchmark

Benchmark:

- ✎ New connections provided within 15 days: 100%

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1.5.2.2 FAULT CLEARANCE

Live calling for fault clearance is done to verify the following.

- ✤ Fault repair by next working day
- ✤ Fault repair within 3 working days

Live Calling Process:

- ✤ Auditors request the operator to provide the database of all the subscribers who reported Faults in one month prior to IMRB auditor visit
- ✤ Calls are made to up to 10% or 100 complainants, whichever is less, per service provider or in case of BSNL, if there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.
- ✤ Auditors check and record whether the fault was corrected within the timeframes as mentioned in the benchmark

Benchmarks:

- ✤ Fault repair by next working day: =>90%
- ✤ Fault repair within 3 working days: =>99%

1.5.2.3 RESOLUTION OF BILLING COMPLAINTS

Live calling is done to verify Resolution of billing complaints within stipulated time. The process for this parameter is stated below.

- ✤ Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically
- ✤ A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator
- ✤ Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

Benchmarks:

98% complaints resolved within 4 weeks

1.5.2.4 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

Live calling is done to verify response time for customer assistance is done to verify the performance of call center in terms of

- ✤ % age of calls answered by operator (voice to voice) within 60 seconds: In 60% of the cases or more
- ✤ % age of calls answered by operator (voice to voice) within 90 seconds: In 80% of the cases or more

The process for this parameter is stated below.

↳ Overall sample size was 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS.

↳ Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.

↳ All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

1.6   COLOUR CODE TO READ THE REPORT

<table>
<tr><td></td><td>**Not Meeting the benchmark**</td></tr>
</table>

1.7   AUDIT METHODOLOGY

As per audit tender, following table explains the audit methodology for Broadband services. Here, a YES signifies that the mentioned parameter gets audited by the given audit method (PMR/ Live Measurement/ Live Calling).

		Parameters	Quarterly PMR Data	3 day live measurement	Live calling
1		Service Provisioning/ Activation time	YES		YES
2		Fault Repair/ Restoration Time	YES		YES
3		Billing Performance			
(i)		Billing Complaints per 100 Bills issued	YES		
(ii)		%age of billing complaints resolved in four weeks	YES		Yes
(iii)		Refund of deposits after closure within 60 days	YES		
4		Response time to the customer for assistance(Voice to Voice)			
(i)		*Within 60 seconds > 60%*	YES		YES
(ii)		*Within 90 seconds > 80%*	YES		YES
5		Bandwidth Utilization/ Throughput:			
		A) Bandwidth Utilization			
-		POP to ISP gateway Node [Intra – network] Links	YES	YES	
-		ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for international connectivity	YES	YES	
		B) Broadband Connection Speed (Download)	YES	YES	
6		Service Availability/Uptime	YES	YES	
7		Packet Loss	YES	YES	
8		Network Latency for wired broadband access)			
(i)		*User reference point at POP / ISP Gateway Note to International Gateway (IGSP/NIXI)*	YES	YES	
(ii)		*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	
(iii)		*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	

1.8 SAMPLING METHODOLOGY

- As per the sampling methodology prescribed by TRAI, all exchanges over 10% of SDCA or 10 SDCAs whichever is more in a licensed service area should be selected for the purpose of audit, live calling and live measurement. However apart from BSNL, all exchanges covered for other operators.

Below list of SDCAs covered during the audit:-

SSA	SDCC	SSA	SDCA
BASTAR	JAGDALPUR	BALAGHAT	BALAGHAT
BASTAR	KANKER	BETUL	BETUL
BASTAR	KONDAGAON	BHOPAL	SEHORE
BASTAR	SUKMA	CHHATARPUR	TIKAMGARH
BILASPUR	BILASPUR	CHHINDWARA	PANDHURNA
BILASPUR	KORBA	DAMOH	DAMOH
DURG	DURG	GUNA	ASHOK NAGAR
DURG	RAJNANDGAON	GWALIOR	DATIA
RAIGARH	RAIGARH	HOSHANGABAD	ITARSI
RAIPUR	BHATAPARA	INDORE	INDORE
RAIPUR	RAIPUR	JABALPUR	SIHORA
SURGUJA	AMBIKAPUR	KHARGONE	BARWANI
RATLAM	RATLAM	MANDLA	NAINPUR
REWA	REWA	MANDSAUR	NEEMUCH
SAGAR	BINA	MORENA	MORENA
SATNA	AMARPATAN	PANNA	AJAIGARH
SHAJAPUR	SHUJALPUR	RAISEN	BARELI
UJJAIN	MAHIDPUR	RAJGARH	SARANGPUR
VIDISHA	VIDISHA		

1.9   EXECUTIVE SUMMARY

1.9.1   PMR QUARTERLY DATA – JFM'16

Parameters	Benchmarks	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Service provsioning uptime							
Percentage connections provided within 15 days	100%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Fault repair restoration time							
Percentage faults repaired by next working days	≥ 90%	91.16%	60.29%	100.00%	95.65%	100.00%	90.29%
Percentage faults repaired within three working days	≥ 99%	99.46%	96.47%	100.00%	100.00%	100.00%	99.31%
Billing performance							
Billing complaints per 100 bills issued	< 2%	0.01%	0.59%	0.00%	NA	0.16%	NA
%age of billing complaints resolved in 4 weeks	100%	100.00%	94.39%	100.00%	NA	100.00%	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	81.40%	100.00%	NA	100.00%	NA
Customer care/helpline assessment (Voice to Voice)							
Percentage calls answered within 60 seconds	≥ 60%	61.48%	NDR	96.32%	95.65%	68.11%	64.63%
Percentage calls answered within 90 seconds	≥ 80%	100.00%	NDR	100.00%	100.00%	100.00%	100.00%
Bandwidth utilisation/Throughput							
Percentage bandwidth utilised on upstream links	< 80%	19.86%	NDR	49.40%	74.43%	75.00%	74.12%
Broadband download speed	≥ 80%	100.00%	87.25%	98.00%	98.50%	87.57%	93.75%
Service availability/uptime	≥ 98%	99.98%	99.81%	98.48%	99.73%	99.91%	99.73%
Packet loss	< 1%	0.00%	1.00%	0.46%	NA	0.15%	0.00%
Network Latency							
POP/ISP Node to NIXI	< 120 msec	67.3	NDR	34	NA	108	NA
ISP node to NAP port (Terrestrial)	< 350 msec	70.95	NDR	25	NA	55	NA

NA: Parameters not applicable for the operators.

The objective assessment of Quality of Service (QoS) carried out by IMRB gives an insight into the overall broadband performance of various operators with a parameter wise performance evaluation as compared to TRAI benchmark.

Following are the parameter wise observations for the operators in MPCG circle.

1.9.1   SERVICE PROVISIONING/ ACTIVATION TIME

- As per audit, all operators met the benchmark for providing new connections within 15 days.

  NA: In the audit period, no new connection was registered with RTL.

1.9.2   FAULT REPAIR/ RESTORATION

- The benchmark of repairing 90% faults within the next day was not met by BSNL.
- The benchmark of repairing 99% faults within next three days of receiving complaints was not met by BSNL.

1.9.3 BILLING PERFORMANCE

- As per audit, all operators met the benchmark for metering and billing credibility.
- BSNL failed to meet the benchmark for resolution of billing complaints within 4 weeks.

NA: Subscribers of Pacenet and Tikona are not applicable because they are under pre-paid service.

- BSNL failed to meet the benchmark of providing refund within 60 days of closure of service.

NA: Subscribers of Pacenet and Tikona are not applicable because they are under pre-paid service.

1.9.4 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

- All operators met the benchmark for answering 60% calls within 60 seconds and 80% calls within 90 seconds as per audit.

  BSNL: - Did not submit the data during the audit.

1.9.5 BANDWIDTH UTILIZATION AND THROUGHPUT

- All operators met the benchmark for bandwidth utilized on upstream links during audit.

  BSNL: - Did not submit the data during the audit.

- All operators met the benchmark for download speed.
- All operators met the benchmark for service availability time as per audit.
- BSNL failed to meet the benchmark for packet loss.

1.9.6 NETWORK LATENCY

- All operators met the benchmark for Network Latency parameters.

  BSNL: - Did not submit the data during the audit.

1.10 LIVE MEASUREMENT

Parameters	Benchmarks	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Bandwidth utilisation/Throughput							
Percentage bandwidth utilised on upstream links	< 80%	19.89%	NDR	67.80%	84.78%	70.05%	78.16%
Broadband download speed	≥ 80%	96.21%	85,26%	93.00%	98.00%	87.93%	92.33%
Service availability/uptime	≥ 98%	99.98%	99.20%	100.00%	100.00%	99.85%	100.00%
Packet loss	< 1%	0.00%	1.00%	0.46%	NA	0.15%	0.00%
Network Latency							
POP/ISP Node to NIXI	< 120 msec	67.3	NDR	34	NA	108	NA
ISP node to NAP port (Terrestrial)	< 350 msec	70.95	NDR	25	NA	55	NA

1.10.1 BANDWIDTH UTILIZATION AND THROUGHPUT

- Pacenet failed to meet the benchmark for bandwidth utilized on upstream links during live measurement.
- All operators met the benchmark of providing committed broadband download speed as per live measurement.
- All operators met the benchmark for service availability time as per live measurement.
- BSNL failed to meet the benchmark for packet loss.

1.10.2 NETWORK LATENCY

During live measurement, all operators met the benchmark for network latency parameters.

- BSNL: - Did not submit the data during the audit.

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1.11 LIVE CALLING

Parameters	Benchmarks	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Service provsioning uptime							
Percentage connections provided within 15 days	100%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Fault repair restoration time							
Percentage faults repaired by next working days	≥ 90%	95.00%	87.00%	90.00%	NA	100.00%	100.00%
Percentage faults repaired within three working days	≥ 99%	100.00%	100.00%	100.00%	NA	100.00%	100.00%
Billing performance							
%age of billing complaints resolved in 4 weeks	100%	100.00%	80.00%	NA	NA	NA	NA
Customer care/helpline assessment (Voice to Voice)							
Percentage calls answered within 60 seconds	≥ 60%	96.99%	89.42%	98.13%	100.00%	85.07%	100.00%
Percentage calls answered within 90 seconds	≥ 80%	98.90%	92.57%	100.00%	100.00%	87.12%	100.00%

NA: Parameters not applicable for the operators.

1.11.1 SERVICE PROVISIONING/ ACTIVATION TIMES

- As per live calling, all operators met the benchmark of providing 100% new connections within the TRAI stipulated timeline of 15 days.

   NA: In the audit period, no new connection was registered with RTL.

1.11.2 FAULT REPAIR/ RESTORATION

- BSNL and RTL failed to meet the benchmark of repairing 90% faults within next working day but all the operators met the benchmark for repairing 99% faults within 3 days.

   NA: -Pacenet had very low/zero base to conduct the live audit.

1.11.3 BILLING PERFORMANCE

- BSNL failed to meet the benchmark for resolution of billing complaints within 4 weeks

   NA: operator's live calling for 'resolution of billing complaints' has not been conducted due to very low/ zero base of billing complaints for the operators.

1.11.4 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

- As per live calling, BSNL and TCL failed to meet the benchmarks for call answered within 60 seconds.

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2. CRITICAL FINDINGS

Service Provisioning/ Activation Time

- As per audit, all operators met the benchmark for providing new connections within 15 days.

  NA: In the audit period, no new connection was registered with RTL.

Fault Repair/ Restoration

- The benchmark of repairing 90% faults within the next day was not met by BSNL.

- The benchmark of repairing 99% faults within next three days of receiving complaints was not met by BSNL.

Billing Performance

- BSNL failed to meet the benchmark for resolution of billing complaints within 4 weeks.

  NA: Subscribers of Pacenet and Tikona are not applicable because they are under pre-paid service.

- BSNL failed to meet the benchmark of providing refund within 60 days of closure of service.

  NA: Subscribers of Pacenet and Tikona are not applicable because they are under pre-paid service.

Response time to customer for assistance

- All operators met the benchmark for answering 60% calls within 60 seconds and 80% calls within 90 seconds as per audit.

  BSNL: - Did not submit the data during the audit.

Bandwidth Utilization and Throughput

- All operators met the benchmark for bandwidth utilized on upstream links during audit. However during live measurement Pacenet failed to meet the benchmark.

  BSNL: - Did not submit the data during the audit.

- BSNL failed to meet the benchmark for packet loss during audit and live measurement.

Network Latency

- All operators met the benchmark for Network Latency parameters.

  BSNL: - Did not submit the data during the audit and live measurement.

Live calling

Service Provisioning/ Activation Times

- As per live calling, all operators met the benchmark of providing 100% new connections within the TRAI stipulated timeline of 15 days.

  NA: In the audit period, no new connection was registered with RTL.

Fault Repair/ Restoration

- During live calling, BSNL and RTL failed to meet the benchmark of repairing 90% faults within next working day but all the operators met the benchmark for repairing 99% faults within 3 days.

  NA: -Pacenet had very low/zero base to conduct the live audit.

Billing Performance

- During live calling, BSNL failed to meet the benchmark for resolution of billing complaints within 4 weeks

  NA: operator's live calling for 'resolution of billing complaints' has not been conducted due to very low/ zero base of billing complaints for the operators.

Response time to customer for assistance

- As per live calling, BSNL and TCL failed to meet the benchmarks for call answered within 60 seconds.

3. DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA AND LIVE MEASUREMENT/ CALLING DATA

3.1 SERVICE PROVISIONING/ ACTIVATION TIME

3.1.1 PARAMETER EXPLANATION

3.1.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to number of applications received at the service provider's level in the following time frames:-

- Number of applications received at the service provider's level
- Number of connections provided within 15 days
- Number of connections provided after 15 days

Live Calling: -

- At least 10% of the subscribers who had requested for new connections in month prior to Audit were called to check whether connection was provided in 15 days

Data for the parameter was extracted from OMC (Operations and Maintenance Center) of the operators.

3.1.1.2 COMPUTATIONAL METHODOLOGY

- Technically Non Feasible (TNF) cases such as unavailability of Broadband infrastructure/ equipment in the Area or Spare Capacity i.e. Broadband Ports including equipment to be installed at the customer premises for activating Broadband connection were excluded from the calculation of this parameter.

- Also, problems relating to customer owned equipment such as PC, LAN Card/ USB Port and internal wiring or non-availability of such equipment were excluded from the calculation of this parameter.

*Percentage connections provided within X working days = No of connections provided within X working days/ Total number of connections registered during the period * 100*

3.1.1.3 BENCHMARK

100 % cases in =<15 working days.

3.1.2   DETAILED FINDINGS - SERVICE PROVISONING

Data Source: OMC (Operations and Maintenance Center) of the operators

As per audit, all operators met the benchmark for providing new connections within 15 days. However, during live calling it was observed that Airtel, D-Voice, Hathway, Indus Media, Siti cable, TTL and You Broadband failed to meet the benchmark of providing 100% new connections within the TRAI stipulated timeline of 15 days.

NA: In the audit period, no new connection was registered with Reliance and TCL.

3.2   FAULT REPAIR/ RESTORATION TIME

3.2.1   PARAMETER EXPLANATION

3.2.1.1   AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to number of fault received and also number of faults cleared at the service provider's level in the following time frames:-

- ✤ Number of faults cleared within 24 hours
- ✤ Number of cleared in more than 1 day but less than 3 days
- ✤ Number of cleared in more than 3 days

Live calling: -

- ✤ Live calling is done to verify 'Fault repair by next working day', 'Fault repair within 3 working days' and 'Fault repair in more than 3 working days'
- ✤ Interviewers ensure that operator provided a list of all the subscribers who reported Faults in one month prior to IMRB staff visit
- ✤ Calls are made to up to 10% or 100 complainants, whichever is less, per service provider or in case of BSNL, if there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.
- ✤ Auditors check and record whether the fault was corrected within the timeframes as mentioned in the benchmark

Data for the parameter was extracted from OMC (Operations and Maintenance Center) of the operators.

3.2.1.2   COMPUTATIONAL METHODOLOGY

- ✤ The time period for fault repair starts from the time when the fault is reported to the service provider either through customer care help line or in person by the subscriber

- ✤ Only the complaints registered till the close of the business hours of the day are to be taken into account. All the complaints registered after the business hours are to be considered as being registered in the next day business hours

    Fault incidence = *(Total no of faults repaired in X working days /Total number of faults reported during the period)*100*

3.2.1.3   BENCHMARK

✤   By next working day: => 90% and within 3 working days: => 99%.

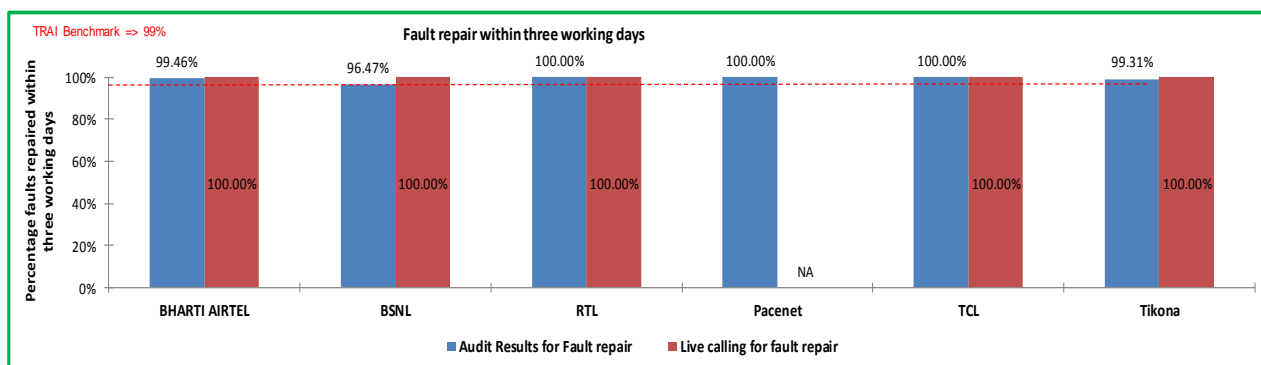### 3.2.2   DETAILED FINDINGS - FAULT REPAIR WITHIN NEXT WORKING DAY
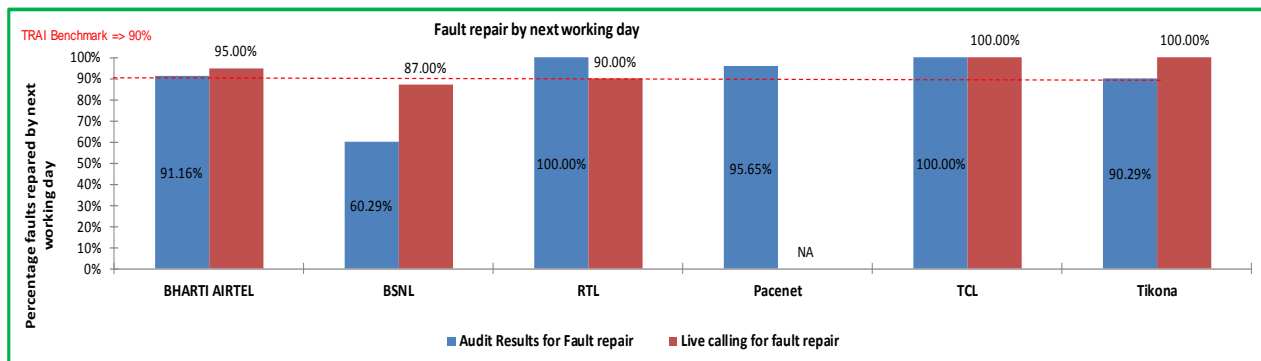
Data Source: OMC (Operations and Maintenance Center) of the operators

BSNL failed to meet the benchmark for the parameter as per audit as well as during live calling.

NA: -Pacenet had very low base to conduct the live audit.

3.2.3   DETAILED FINDINGS - FAULT REPAIR WITHIN 3 WORKING DAYS

Data Source: OMC (Operations and Maintenance Center) of the operators

All operators met the benchmark for the parameter as per audit and live calling.

NA: -Pacenet had very low base to conduct the live audit.

3.3 METERING AND BILLING CREDIBILITY

3.3.1 PARAMETER EXPLANATION – BILLING COMPLAINTS

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20[th] March, 2009 were covered. The types of billing complaints covered are listed below.

- ✎ Payments made and not credited to the subscriber account

- ✎ Payment made on time but late payment charge levied wrongly

- ✎ Double charges

- ✎ Credit agreed to be given in resolution of complaint, but not accounted in the bill

- ✎ Charging for services provided without consent

- ✎ Charging not as per tariff plans

- ✎ Overcharging or undercharging

In addition to the above, any billing complaint which leads to billing error, waiver, refund, credit, or any adjustment is also considered as a billing complaint for calculating the number of disputed bills.

3.3.1.1 AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to –

- ✎ Number of Billing complaints received at the service provider's level
- ✎ Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled.
- ✎ Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills
- ✎ Billing complaint is any of written complaint/ personal visit/ telephonic complaint related to: Excess metering/ wrong tariff scheme charged, Payment made in time but charged penalty/ not reflected in next bill, Last payment not reflected in bill, Adjustment/ waiver not done, Anything else related to bills, Toll free numbers charged etc.
- ✎ Billing complaints resolution database, with opening and closing date of complaint to identify the time taken to resolve a complaint

Live calling:

- ✎ Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically. In case the

sample data is too low to fulfill the target calls, auditors may call subscribers whose complaints got resolved in other months of the same audit period.

✥ A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator

✥ Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

Raw data for the parameter was extracted from central billing center of the operators.

3.3.1.2 COMPUTATIONAL METHODOLOGY – METERING AND BILLING CREDIBILITY

The calculation methodology (given below) as per QoS Regulations 2006 (11 of 2006), was followed to calculate incidence of billing complaints.

$$\text{Billing complaints (\%)} = \frac{\text{total number of disputed bills} \times 100}{\text{total number of bills issued during one billing cycle.}}$$

✥ *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated

✥ **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.

TRAI Benchmark: < 2%

3.3.1.3 METERING AND BILLING CREDIBILITY – AUDIT FINDINGS
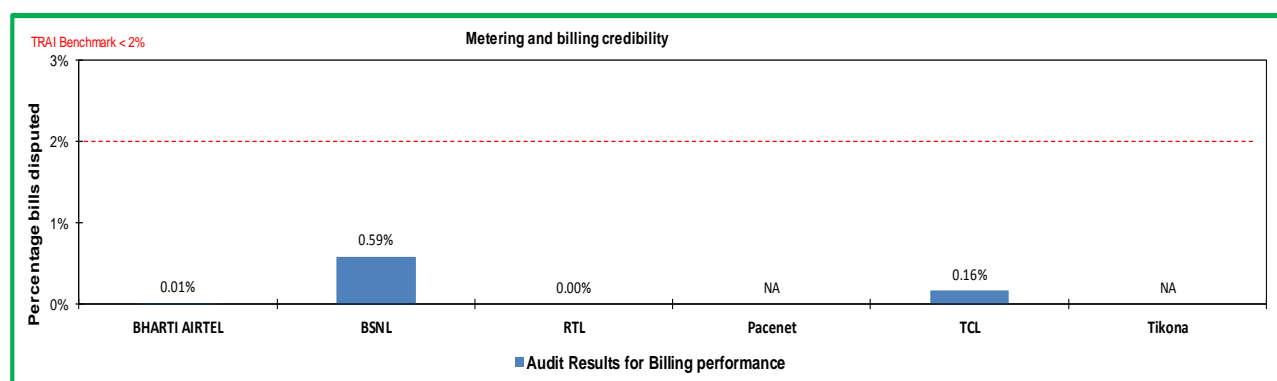
Data Source: Billing Center of the operators

All operators met the benchmark for the parameter.

- NA: Subscribers of Pacenet and Tikona are not applicable because they are under pre-paid service.

3.3.1.4 COMPUTATIONAL METHODOLOGY – RESOLUTION OF BILLING COMPLAINTS

✍ **Calculation of Percentage resolution of billing complaints**

The calculation methodology (given below) as per QoS Regulations 2006 (11 of 2006), and TRAI guidelines (Received on Sep 08, 2014) was followed to calculate resolution of billing complaints.
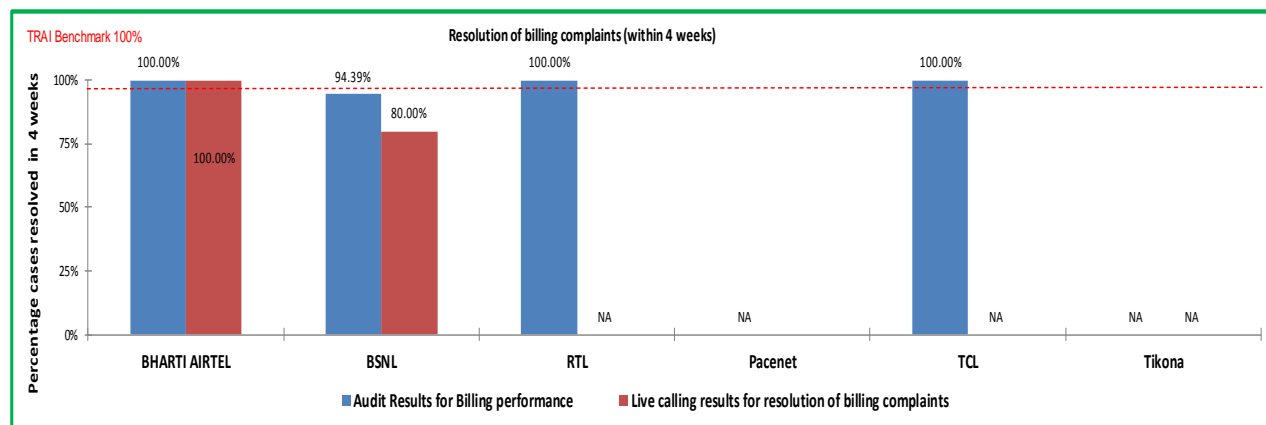
Resolution of billing complaints within 4 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 4 weeks **=**

$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 4 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

3.3.1.5 RESOLUTION OF BILLING COMPLAINTS – AUDIT FINDINGS

As per audit all operators met the benchmark for resolution of billing complaints within 4 weeks except BSNL.

- NA: operator's live calling for 'resolution of billing complaints' has not been conducted due to very low/ zero base of billing complaints for the operators.

3.4 TIME TAKEN TO REFUND AFTER CLOSURE

3.4.1 PARAMETER EXPLANATION

3.4.1.1 AUDIT PROCEDURE

IMRB Auditors collected and verified data pertaining to -

- ✤ Number of cases requiring refund of deposits
- ✤ Number of cases where refund was made within 60 days
- ✤ %age cases where refund was made within 60 days.

Data for the parameter was extracted from central billing center of the operators.
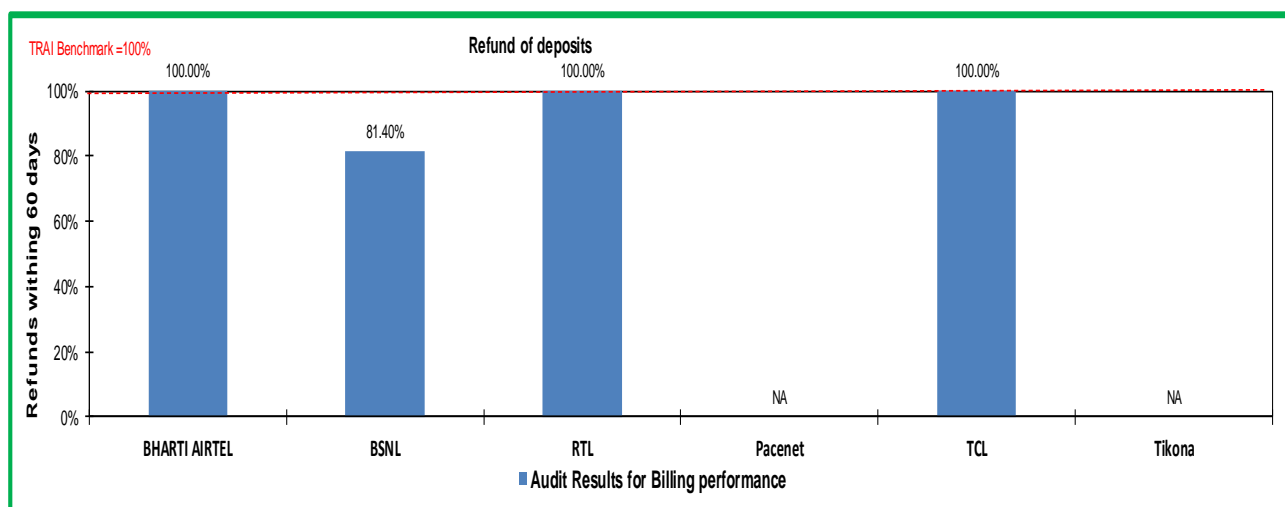
3.4.1.2 COMPUTATIONAL METHODOLOGY

- ✤ Date of closure is considered to be the date on which the connection is discontinued in the service provider database of active customers

Time taken to refund = Date of refund – Date of closure

3.4.1.3 BENCHMARK

- ✤ 100% cases in less than 60 days

3.4.2 DETAILED FINDINGS - REFUND OF DEPOSITS

All operators met the benchmark for the parameter except BSNL

NA: -Operators had no cases where a refund was applicable.

3.5 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

3.5.1 PARAMETER EXPLANATION

3.5.1.1 AUDIT PROCEDURE

IMRB Auditors collected and verified data pertaining to

- ✎ Number of calls received by the operator
- ✎ Number and percentage calls answered within 60 seconds
- ✎ Number and percentage calls answered within 80 seconds

Live calling:

- ✎ Overall 100 number of live calls at different points of time were made in a licensed service area/circle for each service provider to assess the efficiency of the call center

Data for the parameter was extracted from central customer service center of the operators.

3.5.1.2 COMPUTATIONAL METHODOLOGY

%age of calls answered by operator (voice to voice) within n seconds = *(Number of calls where time taken for operator to respond* >= n sec / Total number of calls where an attempt to route to the operator was made) x 100)*.*

Time taken for operator to respond = Time when an operator responds to a call – Time when the relevant code to reach the operator is dialled
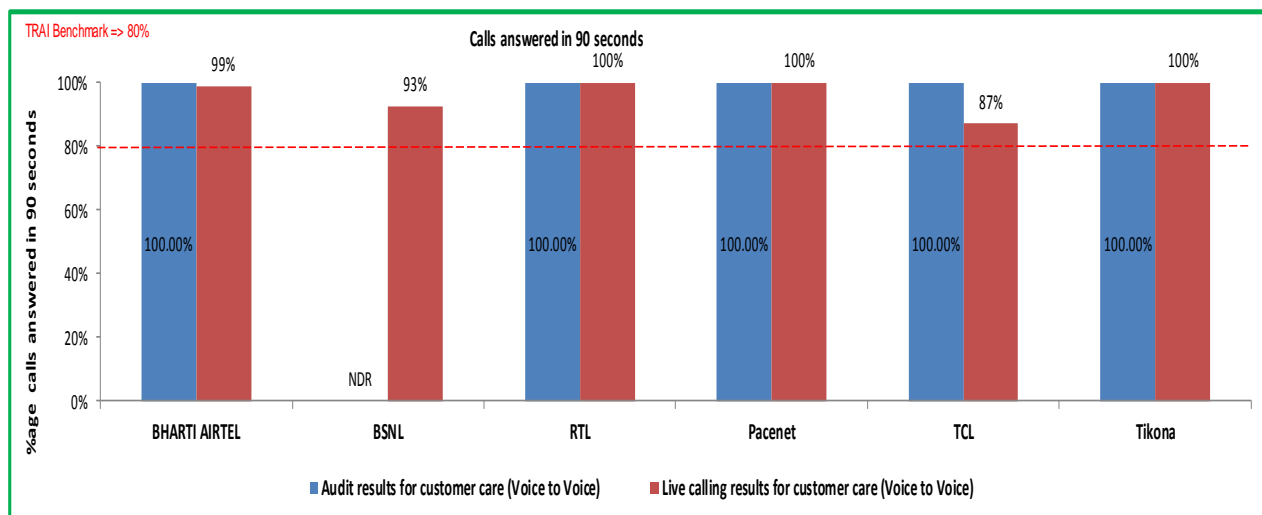
3.5.1.3 BENCHMARK

- ✎ Calls answered within 60 seconds => 60 %
- ✎ Calls answered within 90 seconds => 80%

3.5.2 DETAILED FINDINGS - CALL ANSWERED WITHIN 60 SECONDS
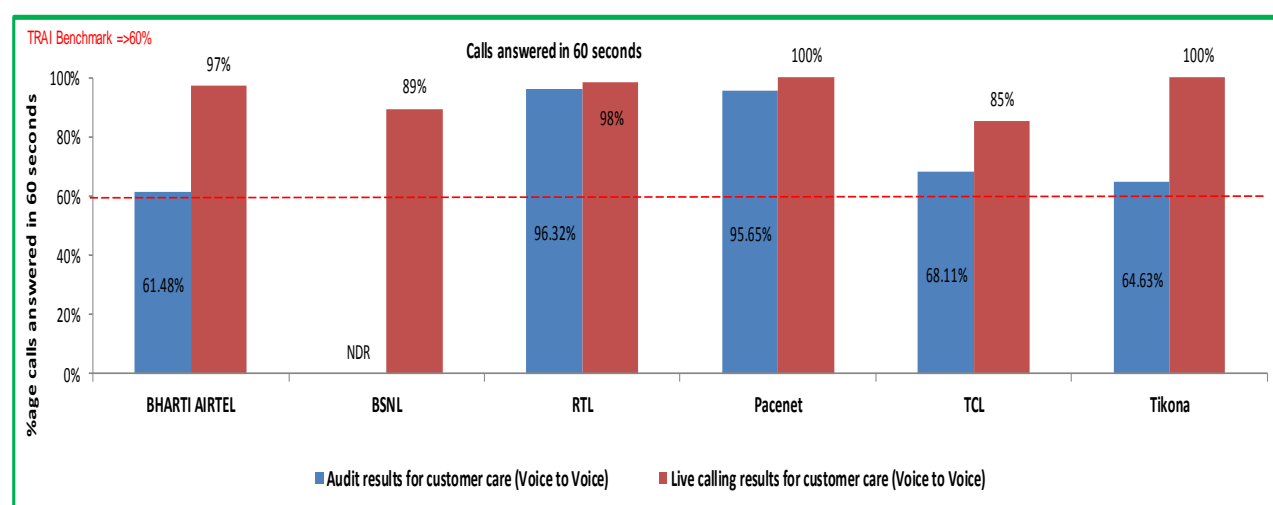
Data Source: Customer Service Center of the operators

3.5.3 DETAILED FINDINGS - CALL ANSWERED WITHIN 90 SECONDS

Data Source: Customer Service Center of the operators

All operators met the benchmark for answering 60% calls within 60 seconds and 80% calls within 90 seconds as per audit.

- NDR: -BSNL did not share the data during the audit.

3.6 BANDWIDTH UTILIZATION & DOWNLOAD SPEED

3.6.1 PARAMETER EXPLANATION – BANDWIDTH UTILIZATION

3.6.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to –

POP to ISP gateway Node [Intra – network] Links

- Auditors to verify and collect data pertaining to Total Bandwidth available and Total Bandwidth utilized during TCBH at some of the sample intra network links (POP to ISP Node) on each of the three days of live measurement separately
- Total Bandwidth available and Total bandwidth utilized during at the sample links TCBH for the complete month of audit
- Total number of intra network links having >90% bandwidth utilization during the month of Audit

ISP Gateway Node to IGSP / NIXI Node upstream Link's) for international connectivity

- Total number of upstream links for International connectivity
- Total number of links having Bandwidth > 90%Total Bandwidth available and Total Bandwidth utilized on all the upstream links during TCBH (POP to ISP Node) on each of the three days of live measurement separately
- Total Bandwidth available and Total bandwidth utilized at all the international links during TCBH for the complete month of audit (Also obtain details separately for the days)

Data for the parameter was extracted from NOC (Network Operations Center) of the operators.

3.6.1.2   COMPUTATIONAL METHODOLOGY

Percentage Bandwidth available on the link = *Total Bandwidth* utilised in TCBH for the period/ Total Bandwidth Available during the period*100*

3.6.1.3   BENCHMARK

- ✤ < 80% link(s)/route bandwidth utilization during peak hours (TCBH).
- ✤ If on any link(s)/route bandwidth utilization exceeds 90%, then network is considered to have congestion. For this additional provisioning of bandwidth on immediate basis, but not later than one month is mandated.

3.6.2   DETAILED FINDINGS – BANDWIDTH UTILIZATION

Audit results for Bandwidth Utilization							
Bandwidth utilization	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**Pacenet**	**TCL**	**Tikona**
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	19.86%	NDR	49.40%	74.43%	75.00%	74.12%
Live measurment results for Bandwidth Utilization							
Bandwidth utilization	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**Pacenet**	**TCL**	**Tikona**
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	19.89%	NDR	67.80%	84.78%	70.05%	78.16%

Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for bandwidth utilization during audit. However during live calling Pacenet failed to meet the benchmark.

3.6.3   PARAMETER EXPLANATION - BROADBAND DOWNLOAD SPEED

3.6.3.1   AUDIT PROCEDURE

Auditors collected and verified the following information from the operator's system.

- ✤ Total committed download speed to the all subscribers (In Mbps) (A)
- ✤ Total average download speed observed during TCBH (In Mbps)

Live Calling/ Measurement:

- ✤ Details of live customers were obtained from the service providers
- ✤ Overall 50 numbers of live calls at were made during peak hours (TCBH) in a licensed service area/circle for each service provider to assess the download speed available to subscribers. A download measurement software tool provided by the service providers was used for the same
- ✤ Details of total committed download speed and speed available to the users were recorded for each of the subscriber

3.6.3.2 COMPUTATIONAL METHODOLOGY

✧ The download speed for one customer is calculated by the download speed measurement software using the formula provided below:

Data Download Speed = Size of test file (data) in ISP server/ Transmission time required for error free transfer of the entire data

Percentage download speed available was calculated as = Sum of total speed available for 50 customers/Total committed download speed for 50 customers*100

3.6.3.3 BENCHMARK

Subscribed broadband connection speed to be met >= 80% from ISP Node to user

Data for the parameter was taken from "Download measurement software" installed in the server at ISP Node of the operators.

3.6.4 DETAILED FINDINGS – BROADBAND DOWNLOAD SPEED

Audit results for broadband download speed							
Broadband download speed	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	100.00%	87.25%	98.00%	98.50%	87.57%	93.75%
Live measurement results for broadband download speed							
Broadband download speed	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	96.21%	85,26%	93.00%	98.00%	87.93%	92.33%

Data Source: Download measurement software installed in the server at ISP Node of the operators

All operators met the benchmark of providing committed broadband download speed as per Quarterly audit and Live Audit.

3.7   SERVICE AVAILABILITY/UPTIME

3.7.1.1   AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to –

- ✤ Total operational hrs.
- ✤ Total downtime hrs.
- ✤ The above mentioned data was obtained and verified separately for three days in which the live measurement was carried out, Month in which audit was carried out/

Data for the parameter was extracted from OMC (Operations and Maintenance Center) of the operators.

3.7.1.2   COMPUTATIONAL METHODOLOGY

- ✤ Total downtime for all users, including the LAN switches, Routers, Servers, etc. at ISP Node and connectivity to upstream service provider are to be included
- ✤ Planned outages for routine maintenance of the system are excluded from the calculation of service availability/uptime

Service availability/Uptime = *(Total operational hours – Total Downtime hrs)*100 / Total operational hours*

3.7.1.3   BENCHMARK

- ✤ =>98% with effect from quarter ending September 2007 and onwards

3.7.2   DETAILED FINDINGS - SERVICE AVAILABILITY
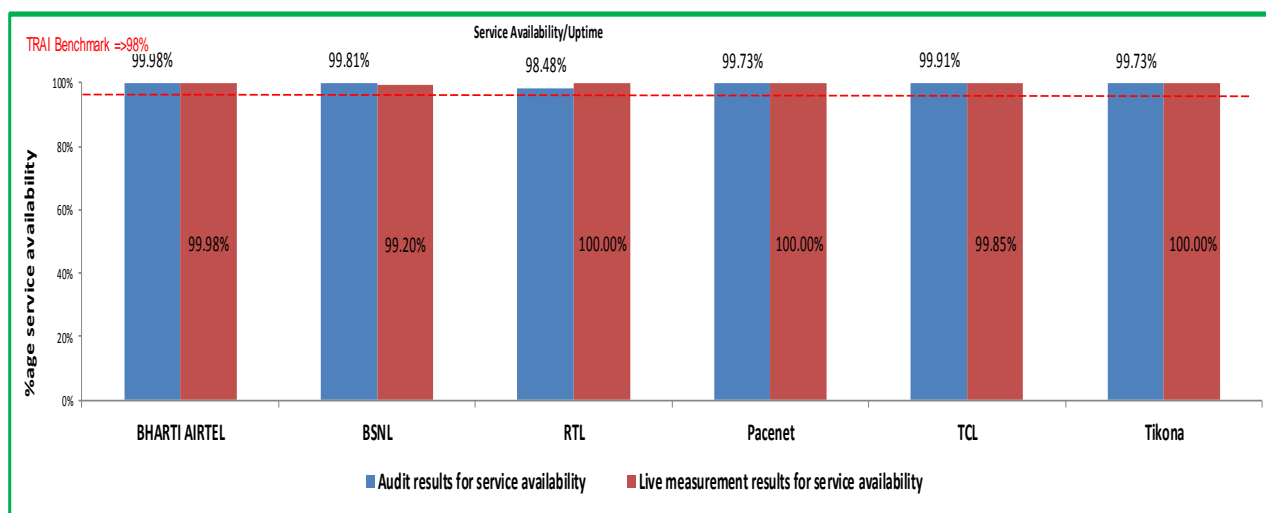
Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for service availability time as per Quarterly audit and Live Audit.

3.8 NETWORK LATENCY & PACKET LOSS

3.8.1 PARAMETER EXPLANATION - NETWORK LATENCY

Network Latency: Network Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/ Customer Premises Equipment (CPE).

3.8.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to:

- ✤ Records maintained for ping tests conducted during the period
- ✤ Smoked ping test (wherever available) results for the period
- ✤ Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours)
- ✤ Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

Data for the parameter was extracted from NOC (Network Operations Center) of the operators.

3.8.1.2 COMPUTATIONAL METHODOLOGY

- ✤ Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/Customer Premises Equipment (CPE). The round trip delay for the ping packets from ISP premises to the IGSP premises to the IGSP/NIXI gateway and to the nearest NAP port abroad are measured by computing delay for 1000 pings of 64 bytes each (Pings are to be sent subsequent to acknowledgement received for the same for previous ping)
- ✤ Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI
- ✤ Minimum sample reference points for each service area shall be three in number or multiple reference points if required

Hence the formula for network latency would be Network latency for X days= *Total round trip time for all the ping packets transmitted in X days /No of days during the period*

3.8.1.3 BENCHMARK

- ✤ < 120 msec from user reference point at POP/ISP Node to International Gateway
- ✤ < 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial)
- ✤ < 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (Satellite)

3.8.2 PARAMETER EXPLANATION – PACKET LOSS

Packet Loss: Packet loss is the percentage of packets lost to the total packets transmitted between two designated CPE/ Router Ports.

3.8.2.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to –

- Records maintained for ping tests conducted during the period
- Smoked ping test (wherever available) results for the period
- Results of live ping tests conducted during three day live measurement and month of Audit (During TCBH)
- Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

Data for the parameter was extracted from NOC (Network Operations Center) of the operators.

3.8.2.2 COMPUTATIONAL METHODOLOGY

- Packet loss is the percentage of packets lost to total packets transmitted between two designated Customer Premises Equipment's/Router ports. It is the measurement of packet lost from the broadband customer (User) configuration/User reference point at POP/ISP Node to IGSP/NIXI Gateway and to the nearest NAP port abroad
- The packet loss is measured by computing the percent packet loss of 1000 pings of 64 byte packet each.
- Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI
- Minimum sample reference points for each service area were three in number or multiple reference points if required

Hence Packet loss is computed by the formula: *(Total number of ping packets lost during the period/Total number of ping packets transmitted)* 100*

3.8.2.3 BENCHMARK

- Packets Loss <1 %

3.8.3 DETAILED FINDINGS - NETWORK LATENCY / PACKET LOSS

Audit results for Latency and packet loss							
Network Latency and Packet Loss	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Packet Loss (Percentage)	< 1%	0.00%	1.00%	0.46%	NA	0.15%	0.00%
Network Latency							
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	67.3	NDR	34	NA	108	NA
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	70.95	NDR	25	NA	55	NA
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NDR	NA	NA	NA	NA
Live measurement results for Latency and packet loss							
Network Latency and Packet Loss	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Packet Loss (Percentage)	< 1%	0.00%	1.00%	0.46%	NA	0.15%	0.00%
Network Latency							
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	67.3	NDR	34	NA	108	NA
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	70.95	NDR	25	NA	55	NA
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NDR	NA	NA	NA	NA

Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for network latency related parameters.

- NDR: -BSNL did not share the data during the audit.

4. ANNEXURE – JFM'16

4.1 SERVICE PROVISIONING

Audit Results for Service provisioning							
	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Total connections registered during the period		19768	995	NA	316	136	3625
Number of connections provided within 15 days		19768	995	NA	316	136	3625
Percentage of connections provided within 15 days	100%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Number of connections provided after 15 days of registration of demand		NA	NA	NA	NA	NA	NA
percentage of connections provided after 15 days of registration of demand	100%	NA	NA	NA	NA	NA	NA
Number of customers to whom credit is given for delayed connections		NA	NA	NA	NA	NA	NA
Percentage of customers to whom credit is given for delayed connections	100%	NA	NA	NA	NA	NA	NA
Live calling for Service provisioning							
	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Total connections registered during the period		100	100	NA	100	50	100
Number of connections provided within 15 days		100	100	NA	100	50	100
Percentage of connections provided within 15 days	100%	100.00%	100.00%	NA	100.00%	100.00%	100.00%

Data Source: Operations and Maintenance Center (OMC) of the operators

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4.2 FAULT REPAIR/ RESTORATION

Audit Results for Fault repair							
Fault repair	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**Pacenet**	**TCL**	**Tikona**
Total No. of faults registered during the period		19144	3480	173	23	298	11770
No. of faults repaired by next working day during the period		17451	2098	173	22	298	10627
Percentage of faults repaired by next working day during the period	≥ 90%	91.16%	60.29%	100.00%	95.65%	100.00%	90.29%
No. of faults repaired within 3 days during the period		19040	3357	173	23	298	11689
Percentage of faults repaired within 3 days during the period	≥ 99%	99.46%	96.47%	100.00%	100.00%	100.00%	99.31%

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Rent rebate	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**Pacenet**	**TCL**	**Tikona**
Percentage of cases where rent rebate for >3 days was given	100%	NA	NA	NA	NA	NA	NA
Percentage of cases where rent rebate for 15 days was given	100%	NA	NA	NA	NA	NA	NA
Percentage of cases where rent rebate for 30 days was given	100%	NA	NA	NA	NA	NA	NA

Data Source: Operations and Maintenance Center (OMC) of the operators and live calls conducted by the auditors from operator's network

Live calling for fault repair							
Fault repair	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**Pacenet**	**TCL**	**Tikona**
Total Number of calls made to subscribers		100	100	50	NA	35	100
Number of cases where faults were repaired by next working day		95	87	45	NA	35	100
Percentage cases where faults were repaired by next working day	≥ 90%	95.00%	87.00%	90.00%	NA	100.00%	100.00%
Number of cases where faults were repaired within 3 days		100	100	50	NA	35	100
Percentage cases where faults were repaired within 3 days	≥ 99%	100.00%	100.00%	100.00%	NA	100.00%	100.00%

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4.3 BILLING PERFORMANCE – METERING AND BILLING CREDIBILITY

Audit Results for Billing performance							
Billing Performance	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Billing diputes							
Total bills generated during the period		5,23,131	127484	25783	NA	620	NA
Total number of bills disputed		63	748	16	NA	1	NA
Percentage bills disputed (Avg of 3 billing cycles)	≤ 2%	0.01%	0.59%	0.00%	NA	0.16%	NA
Resolution of billing complaints							
Total number of complaints		63	748	4	NA	1	NA
Total complaints resolved in 4 weeks from date of receipt		63	706	4	NA	1	NA
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	94.39%	100.00%	NA	100.00%	NA
Refund of deposits							
Total number of cases requiring refund		169	2279	15	NA	NA	NA
Total number of cases where refund was made within 60 days		169	1855	15	NA	NA	NA
Percentage cases in which refund was received within 60 days	100%	100.00%	81.40%	100.00%	NA	100.00%	NA

Data Source: Billing Center of the operators

Live calling results for resolution of billing complaints							
Resolution of billing complaints	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Total Number of calls made		50	15	NA	NA	NA	NA
Number of cases resolved in 4 weeks		50	12	NA	NA	NA	NA
Percentage cases resolved in 4 weeks	≥ 98%	100.00%	80.00%	NA	NA	NA	NA
Number of cases resolved in 6 weeks		50	15	NA	NA	NA	NA
Percentage cases resolved in 6 weeks	100%	100.00%	100.00%	NA	NA	NA	NA

Data Source: Live calls conducted by the auditors from operator's network

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4.4 RESPONSE TIME TO THE CUSTOMER FOR ASSISTANCE

Audit results for customer care (Voice to Voice)							
Calls Answered within 60 seconds							
Customer Care Assessment	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Total Number of calls received		3,42,157	NDR	114391	23	370	133668
Total Number of calls answered within 60 seconds		2,10,345	NDR	110182	22	252	86385
Percentage calls answered within 60 seconds	≥ 60%	61.48%	NDR	96.32%	95.65%	68.11%	64.63%

Calls Answered within 90 seconds							
Total Number of calls received		342157	NDR	114391	23	370	133668
Total Number of calls answered within 90 seconds		342157	NDR	114391	23	370	133668
Percentage calls answered within 90 seconds	≥ 80%	100.00%	NDR	100.00%	100.00%	100.00%	100.00%

Data Source: Customer Service Center of the operators

Live calling results for customer care (Voice to Voice)							
Customer Care Assessment	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Total Number of calls received		100	100	100	100	100	100
Total Number of calls answered within 60 seconds		97	89	98	100	85	100
Percentage calls answered within 60 seconds	≥ 60%	97%	89%	98%	100%	85%	100%
Total Number of calls answered within 90 seconds		99	93	100	100	87	100
Percentage calls answered within 90 seconds	≥ 80%	99%	93%	100%	100%	87%	100%

Data Source: Live calls conducted by the auditors from operator's network

4.5   BANDWIDTH UTILIZATION

Audit results for Bandwidth Utilization							
Bandwidth utilization	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**Pacenet**	**TCL**	**Tikona**
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	19.86%	NDR	49.40%	74.43%	75.00%	74.12%
Live measurment results for Bandwidth Utilization							
Bandwidth utilization	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**Pacenet**	**TCL**	**Tikona**
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	19.89%	NDR	67.80%	84.78%	70.05%	78.16%

Data Source: Network Operations Center (NOC) of the operators

4.6   BROADBAND DOWNLOAD SPEED

Audit results for broadband download speed							
Broadband download speed	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**Pacenet**	**TCL**	**Tikona**
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	100.00%	87.25%	98.00%	98.50%	87.57%	93.75%
Live measurement results for broadband download speed							
Broadband download speed	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**Pacenet**	**TCL**	**Tikona**
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	96.21%	85,26%	93.00%	98.00%	87.93%	92.33%

Data Source: Download measurement software installed in the server at ISP Node of the operators

4.7   SERVICE AVAILABILITY/ UPTIME

Audit results for service availability							
Service Availability	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**Pacenet**	**TCL**	**Tikona**
Service Availability Uptime in Percentage	≥ 98%	99.98%	99.81%	98.48%	99.73%	99.91%	99.73%
Live measurement results for service availability							
Service Availability	**Benchmark**	**BHARTI AIRTEL**	**BSNL**	**RTL**	**Pacenet**	**TCL**	**Tikona**
Service Availability Uptime in Percentage	≥ 98%	99.98%	99.20%	100.00%	100.00%	99.85%	100.00%

Data Source: Operations and Maintenance Center (OMC) of the operators

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4.8 NETWORK LATENCY / PACKET LOSS

Audit results for Latency and packet loss							
Network Latency and Packet Loss	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Packet Loss (Percentage)	< 1%	0.00%	1.00%	0.46%	NA	0.15%	0.00%
Network Latency							
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	67.3	NDR	34	NA	108	NA
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	70.95	NDR	25	NA	55	NA
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NDR	NA	NA	NA	NA
Live measurement results for Latency and packet loss							
Network Latency and Packet Loss	Benchmark	BHARTI AIRTEL	BSNL	RTL	Pacenet	TCL	Tikona
Packet Loss (Percentage)	< 1%	0.00%	1.00%	0.46%	NA	0.15%	0.00%
Network Latency							
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	67.3	NDR	34	NA	108	NA
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	70.95	NDR	25	NA	55	NA
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NDR	NA	NA	NA	NA

Data Source: Network Operations Center (NOC) of the operators

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